RESIDENTIAL TYPOLOGICAL STUDIES: SAN JUAN, PUERTO RICO

by

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ABSTRACT

The thesis presents a study of five residential communities in Metropolitan San Juan, Puerto Rico. These communities were chosen because they represent the five most typical communities in the Metropolitan Area: squatter settlements, public housing projects, colonial spanish settlements and early 20 th century "barrio" settlements.

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Horacio Caminos, Professor of Architecture, Thesis Supervisor

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INTRODUCTION

The urbanization of Metropolitan San Juan is primarily the result of the process of conurbation, the growth of communities through accretion around an existing urban center.

Some of these communities were, by economic necessity, imposed and artificial, as in the case of public housing projects. Others were born as marginal living areas, as in the case of squatter settlements.Some were started by speculators, but developed by the users, as in the case of the "barrios" of East Santurce. Others were instant developments, acquired complete and unchangeable, as in the case of the tract housing developments, the "urbanizaciones". Or they were communities which reflect a legal restrictive framework coupled with an infill developed by the users, as in the case of Viejo San Juan.

This makes the study of existing communities important because it is in the comparative study of them that one can understand them and, through that understanding formulate policy governing their creation, developement and maintenance.

Unfortunately, in the last twenty years, this has been ignored or, worst, misinterpreted. The goverment's housing policy of a "decent" home and environment for every family or individual has resulted in the creation of instant complete communities: the public housing projects and the tract housing developments. Though mostly the result of economic pressure (through Federal Aid), they are also the result of the lack of interpretative historical hindsight on the part of the planners who created housing policy after 1945 and all but ignored the communities already established and the teachings to be found in them.

With this in mind, the following case studies present the physical and socio-economic conditions which exist in five representative communities in Metropolitan San Juan. They were chosen as examples because comparatively and by themselves they show the physical and socio economic advantages of the community they represent; information which should be used in the creation and development of urban residential policies.

URBAN HISTORY

HISTORY: The development of Metropolitan San Juan can be divided into three periods which parallel closely periods of political, social and economical change, not only in the city but also in the country.

These periods correspond first to the Spanish hegemony prior to 1898; second, to the rise of American interests in sugar between 1898 and 1940 and the subsequent depression, and, third, to the rise of an industrial state after 1940.

When the Spanish government left in 1898, they left little urban evidence of their stay in Puerto Rico. Their occupation had been restrictive and restricting. From its start in the 16th Century, through the 17th and most of the 18th, Spain considered Puerto Rico mainly a military colony not worthy of any significant economic development. Trade with the exterior was curtailed or inhibited; interior trade was hindered by taxes and poor communications, and agriculture was hindered by laws of usufruct and inheritance. The native population was poor and dependent on the decisions of the military/clerical colonial government.

The city of San Juan which evolved in this period was not only the result of limitations established by the law of the Indies, the fortifications, and the locale but also of politics and economics. The northwest areas of the city, where urbanization began, became the residential area for the civil, military and clerical representatives of the Spanish empire in Puerto Rico. The main civic and religious areas and buildings were located in this area, a fact underlined in the later centuries of development by the great number of buildings two stories or higher. The periphery of this area, particularly on the northeast, was the quarters of the poor devoid of any important civic or religious building or area, and single story in character. Bordering the bay were the trade facilities which served the ships between the Americas and Spain.

By the start of the 19th Century, Spain had begun to loosen its stifling grip on Puerto Rico and San Juan. The first steps had started in the mid-18th Century when Spain, recognizing the economic burden of the island and its potential as a market, authorized commerce between Puerto Rico, Hispaniola and Spain. By the end of the 18th Century, Puerto Rico not only traded with Spain and its colonies but also with various neutral nations. Though this did not mean the end of military influence on Puerto Rico it meant a new economy, based not on Spanish doles but on labor intensive agriculture and external trade, and the rise of internal social, economical and political aspirations.

The city reached its saturation within the planned walls in the 17th Century, but until the mid 18th Century it still retained the social, economical and political segregation of previous centuries. However, the mercantile implications of the new policies changed this pattern. The city became a warehouse of transient goods, and the main center for processing, exporting and importing trade between the Island and the exterior. This gave rise to a whole new insular class: traders, businessmen, etc., whose newly found wealth and physical necessities were reflected in the physical character of San Juan through the creation of newer and better physical facilities for their residential, economical and social necessities. It also encouraged better communications and growth between San Juan and the surrounding towns of Rio Piedras, Catano, Bayamon, and Guaynabo, which were growing as centers of interchange between the city of San Juan and the agricultural areas.

When the war between the U.S. and Spain started in 1898, Puerto Rico was, in relationship to Spain, in a very advantageous position since it was in the administrative process of becoming semi-autonomous. Even for its small size, it had a potentially strong economy based on agriculture; primarily, labor intensive coffee and secondarily, sugar and tobacco. Its population was mainly rural composed of tenant farmers, "agregados," living on coffee estates or in small sugar or tobacco plantations. Only 15% of its population was urban, and of this only 1/3 were in San Juan.

The American invasion changed all this. Unlike the Spaniards, the Americans recognized immediately the economic important of Puerto Rico as a source of cheap, seasonal labor, as well as cheap, accessible flat land. The result was the transformation of an economy based primarily on labor intensive coffee, with small to medium size estates in the mountains to large corporation-owned sugar plantations on the coastal plains. This resulted in a large migration to the plains, then to the cities, particularly to San Juan, of a large percent of the coffee plantations' "agregados," who could not find work in the sugar industry or were laid off during the slack season.

San Juan's economic base continued its importance as a trade center. With the increasing population, a large urban market was created. Puerto Rico's source of income, mainly through the exportation of sugar was based on trade with the U.S. Now, with a large captive urban audience which could rely less and less on locally produced goods, it also became a primary market for U.S. goods. At first, this trade reflected on basic necessities but when the market was proven, the created necessities of the foreign imposed lifestyles were also imported. At a local level, a consumer society was created which varied from large financial institutions and large American-type stores to local commercial enterprises and small "cottage" and tertiary industries catering to the urban poor.

The city grew physically in two ways. In the first two decades of the Twentieth Century, a "natural" growth was concentrated in the areas of Puerta de Tierra, Santurce and adjacent to the main highway and train line which ran north to south, connecting San Juan to its most important client town, Rio Piedras. But with the ever increasing migration into the city, squatter settlements began to appear around the west shore of San Juan bay, the Caño Martin Pena and Laguna San Jose. The Island of San Juan, Old San Juan and Puerta de Tierra deteriorated with the subdivision of houses into tenements for the poor.

In Santurce, Rio Piedras and in the land between them, housing was located in "Barrios" (Neighborhoods), in properly constructed and subdivided land, oriented by standards set by the Health Department with all the complimentary infrastructure and community services.

In the Bay, the Caño and the Laguna, most houses were shanties, constructed on flooded or floodable marsh areas belonging to the government, lotified by imminent domain, and lacking infrastructure as well as community services. The people of these "Barrios" comprised the bulk of the urban population; the merchants, teachers, businessmen, medics, government workers, contractors, etc., which the urbanization of San Juan demanded. The people of the squatter settlements were the displaced poor, dependent on a tertiary economy in which they were in the lowest level. During this period, an attempt was made by the private/public sector to provide the low income with lots which they could buy for a minimal cost and which included infrastructure and community services. This resulted in the urbanization of the eastern part of Santurce in the areas of Villa Palmeras, Barrio Obrero, Las Palmas, etc. In a limited way, it was successful but the influx of poor people was too great and most could not even afford to buy the small lots.

The economics of sugar, the social well being of the ruling class and the provision in the first three decades of the Twentieth Century of political gains, such as American citizenship, no federal direct taxes, had helped the socio-economic and political status quo to be accepted with little opposition from the ruling Puertorican establishment.. But, by the late 1930's, the sugar economy had begun to falter and American interests began to look elsewhere for investment of their capital. The fall of this one-crop industry tremendously soured the relationship between the U.S. and Puerto Rico in the late 1930's and spurred various pro-autonomy or independence movements. This, coupled with a depression, natural disasters, New Deal ideas, as well as the coming war, forced the U.S. to look at Puerto Rico with new eyes.

The lack of planning was noted and various studies were undertaken. In directive terms, these plans came to naught, but were the seed of other ideas in the next decades. The Puerto Rico Reconstruction Authority was created to coordinate economic recovery from the depression. Though ambitious in social goals, most programs under this agency only resulted in public work projects. It also resulted in a division within the agency which was in charge of the urbanization aspects of planning and from which many ideas of urban architecture and planning of the next three decades were to emerge. The economy, both at the island as well as the city level, was based upon consumer goods as well as work given by the government to provide jobs.

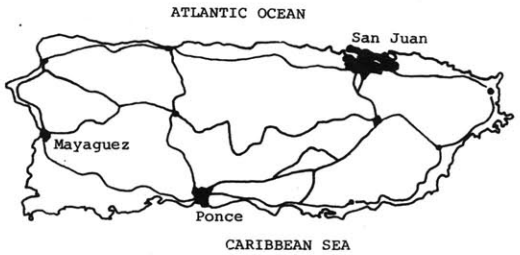
The 1940's and the beginning of the 1950's saw a change from a rural economy to an industrial one, and a change from a government dominated by Americans to a representative government dominated by Puertoricans. In 1942, an agency for planning at urban, municipal and insular levels was created. Though not as ambitious as originally proposed, it had far reaching powers at all levels of planning and was not, theoretically, subservient to politic impact. It was entrusted with the creation of a plan for the integral development of Puerto Rico. In 1947, the Industrial Incentives Act opened the door for Operation Bootstrap and the industrialization of Puerto Rico by attracting to the island manufacturing firms through tax exemptions, cheap trainable labor, and a benign economic climate. The rise of manufacturing followed with construction and then tourism. The Planning Board was to be a planning and regulatory agency. However, the Agency stopped its main goal of formulating insular regulatory plans and was mainly concerned with zoning, granting construction permits and creating socio-economic reports which would assist the industrialization and development of Puerto Rico.

All this was reflected in the physical development of San Juan after 1940. One of the first undertakings after the World War II was over was the eradication of all squatter settlements in San Juan. One vehicle for this was the creation of Public Housing, the first of various programs to provide housing for the poor using the concept of subsidized rent or mortgage. Though modest at first, the projects became bigger and they soon became known as "caserios" because they grouped a large number of walk-up structures in one area. The "caserios" were also one of the first signs of an urbanized area whose physical character was dictated by U.S. standards, a provision asked by the U.S. Government in exchange for complete, matching, or partial aid in the construction of this type of housing.

At the start of the 1950's, two other transplanted urban phenomena occurred in Puerto Rico. The end of the war and the process of industrialization had created a large middle class in Puerto Rico desirous of detached housing. The housing policy in Puerto Rico encouraged by the Junta de Planificacion and the newly created housing authority was that every family should have its own home, but most families were unable to acquire conventional mortgages from local banks. The Federal Government made mortgages accessible through the Federal Homes Administration, Farmers Home Administration, and Veterans Administration. The price San Juan was to pay for this was large scale federal housing regulations and urban sprawl through tract housing developments. Urban sprawl and the dispersion of industrial areas created the necessity for more and better vehicular circulation. A large scale, pre-planned vehicular circulation network was created, funded mainly with Federal funds and thus subject to Federal regulations and standards.

From the 1950's to the present, most urban growth in San Juan has been the result of public housing on a small scale and, on a large scale, of tract housing built around shopping centers or commercial strips and industrial areas spread evenly around the city. Some squatter settlements were eradicated while some have been consolidated and received full services and title to the land. There are plans for inner city redevelopment, but they have not been carried out for economic reasons. The only exception has been San Juan Viejo, which is being restored for historic reasons. High density solution for the upper middle classes and very low classes has been attempted in the inner city through igh rise condominiums and "caserios," both following Federal standards.

URBAN CONTEXT



POPULATION: The population of Metropolitan San Juan was estimated to be over one million in 1977 (851,247 in 1970 Census) which accounted for 32% of the total population and 56% of the urban population. Of this population, 18% were located in Bayamon, 3.2% were located in Cataño, 6.7% were located in Guaynabo, 55% were located in San Juan, 22% in Trujillo Alto and 12% in Carolina. This implies a density of 4700 persons per square miles. Of this population, 25% were under 19, 2.6% were over 65 and 30% were in the labor force. There were 188,564 households with an average size of 4 persons. The birth rate is 20.8. The death rate is 8.7.

GOVERNMENT: The San Juan Metropolitan Area encompasses most of six municipalities and seven cities or towns which lie in, or are the administrative seats of the municipalities. These are the cities and municipalities of Bayamon, Cataño, Guaynabo, San Juan, Trujillo Alto, and Carolina and the city of Rio Piedras, which is part of the municipality of San Juan. (Levittown, a track housing development in the municipality of Toa Baja, lies adjacent to the Metropolitan Area and is considered part of it.) Of these San Juan is the most important, being the largest, as well as the historic, cultural, civic, commercial and industrial hub.

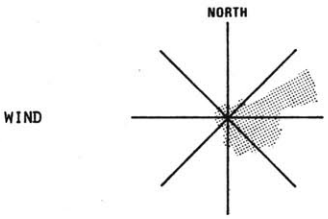
The San Juan Metropolitan Area is the seat of government not only for six municipalities but also for most Federal (U.S.) and Puertorican government agencies. The Puertorican Executive offices, the Legislature and the Supreme Court, as well as the main offices of the main federal and state offices are located in the municipality of San Juan. The six municipalities are governed by a mayor and a Municipal Assembly elected by the constituents of the municipality. Under the mayor and the Assembly are various agencies which deal with problems at a municipal scale or, in conjunction with other municipalities, at a metropolitan scale. Until recently, planning for the municipalities was done at the state level, but now San Juan and Bayamon have started their own Municipal Planning offices.

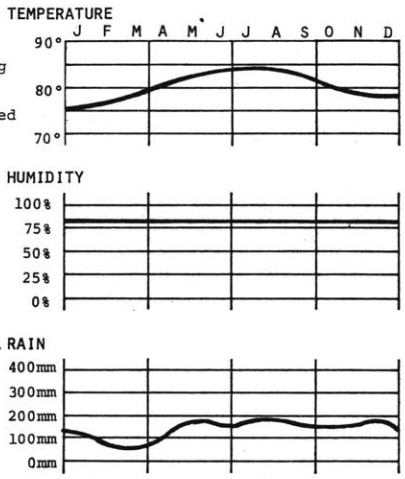
EDUCATION: Education in Puerto Rico is compulsory through the 12th grade. In 1970, 27% of the population of Metropolitan San Juan were in school. Of these, 20% were in private primary and secondary schools, 67% were in public primary and secondary schools, and 13% were in private or public universities. In the public schools, 83% were in primary and 17% were in secondary schools.

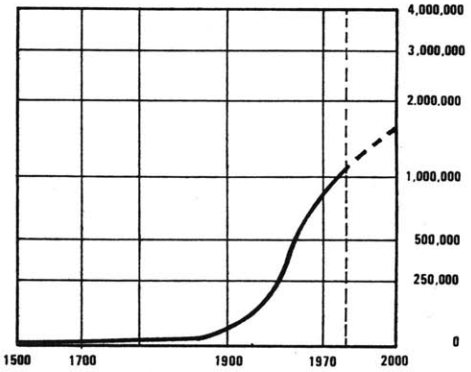
TRANSPORTATION: In the public sector there are buses belonging to the Metropolitan Bus Autority and the ferries which shuttle between San Juan Viejo and Cataño. In the private sector, there are buses, metered taxis, "publicos" (fixed rate cars), as well as private automobiles, of which there are 278,269 in the metropolitan area.

There are two airports in the Metropolitan area. The main airport, Aeropuerto Internacional de Isla Verde, is located in municipality of Carolina and is the main point of connection between Puerto Rico, the U.S. mainland, and other countries. The other airport is Isla Grande, in the municipality of of San Juan, and is used mainly by private planes. In 1975, 5,200,000 passengers flew in or out of the Island through the Aeropuerto Internacional de Isla Verde as well as 235,000 tons of cargo.

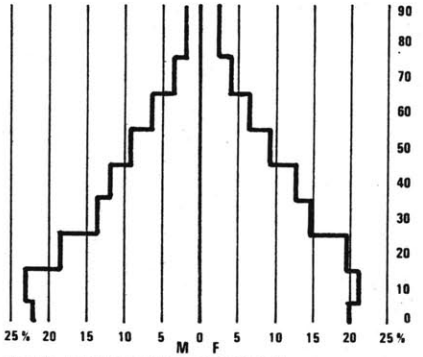
Port facilities for the Metropolitan area are located in San Juan Bay. Facilities are available for large ocean liners, general cargo ships, as well as the container ships.



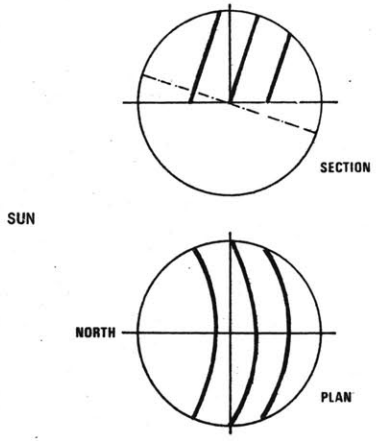


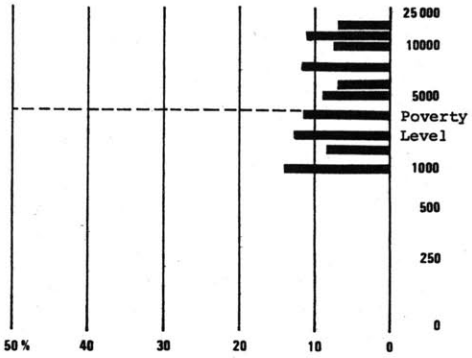


URBAN POPULATION GROWTH
horizontal: dates vertical: population
Source: U.S. Census

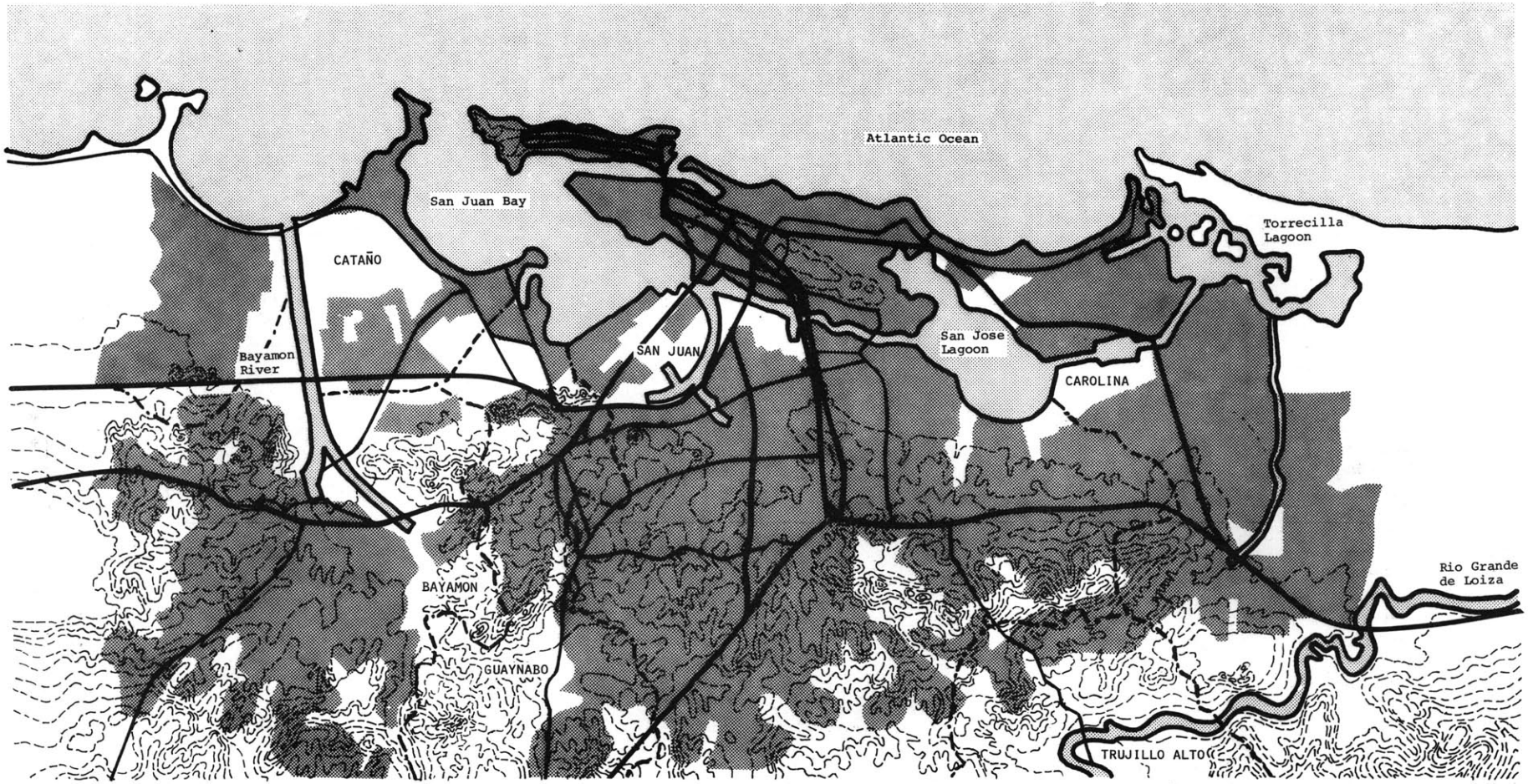


URBAN POPULATION DISTRIBUTION
horizontal: percentages vertical: ages
males: M females: F
Source: U.S. Census 1970





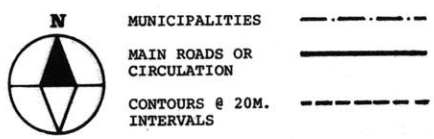
URBAN ANNUAL INCOME DISTRIBUTION
horizontal: percentages vertical: dollars
Source: U.S. Census 1970

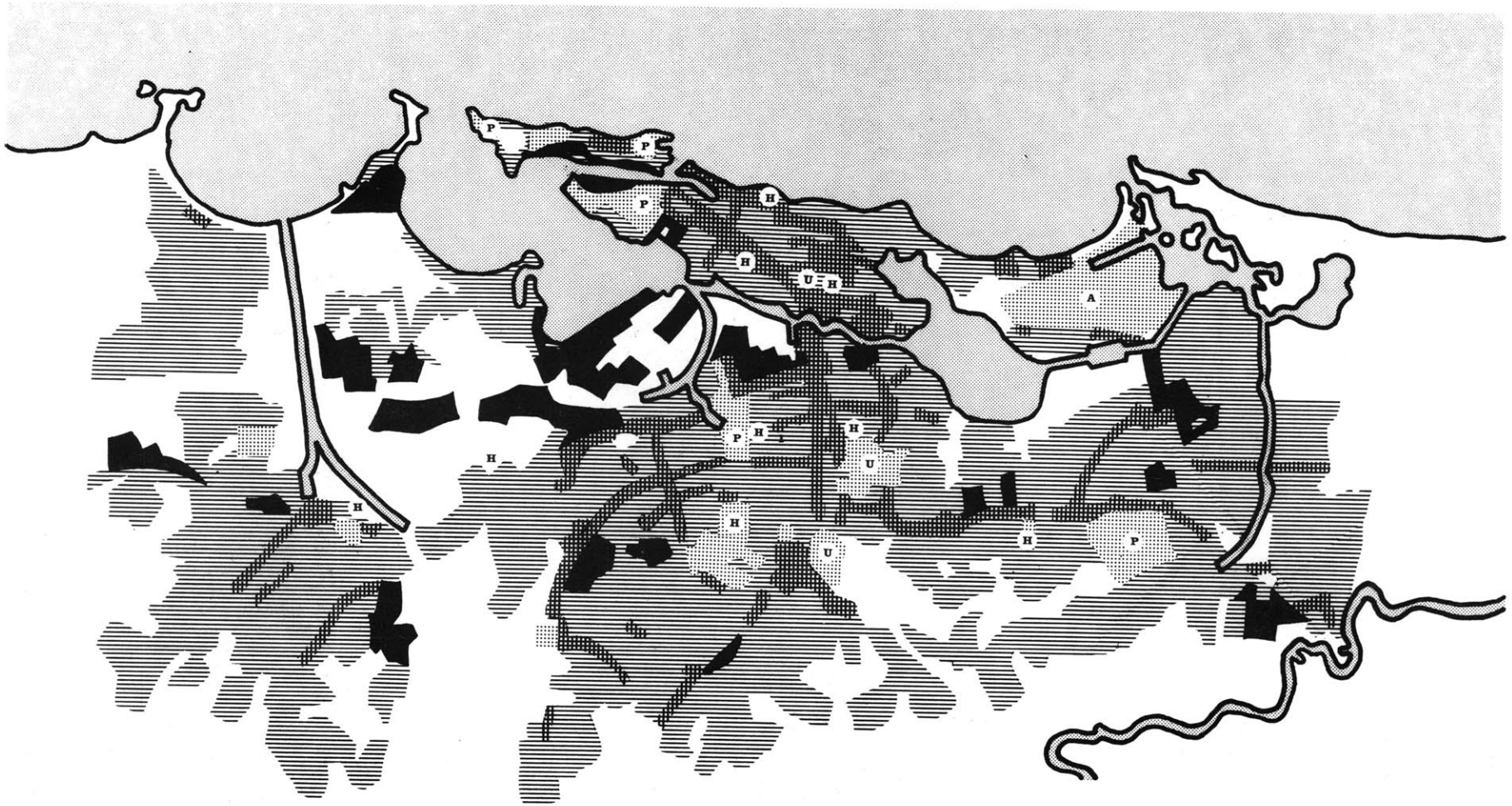


GEOGRAPHY: The San Juan Metropolitan Area lies on the north of the island of Puerto Rico on the intersection of 18°29 N latitude and 66°7 W longitude. It is bordered by physical boundaries on two sides--to the north is the Atlantic Ocean and to the south the slopes of the Cordillera Central. Within its boundaries there are several important bodies of water: a bay (San Juan Bay), three lagoons (Condado, San Jose and Torrecilla), two large rivers, (Bayamon and Rio Grande de Loiza), and two important channels (Martin Peña and Suarez). Topographically, the land is flat between the Cordillera Central and the Ocean but there are two major exceptions.The first are the 15 to 45 mts cliffs in the north-northwest part of the island of San Juan. The second is a long low hill, 25 mts high, which lies between the Atlantic Ocean and the Caño Martin Peña. There is also one island, that of San Juan.

CIRCULATION: The existing circulation layout is mainly the result of efforts made after World War II to interconnect the Metropolitan Area and give it access to the rest of the island. There are three main limited access higways: De Diego Expressway which runs from the center of the Area to the west, Loiza Expressway which runs to the east, and Las Americas Expressway which runs to the south. There are two main limited access highways in the city: Luis Munoz Rivera and Baldorioty de Castro. There are three interior divided highways: Roosevelt, Pinero and Barbosa as well as three divided highways leading out of the city: Kennedy, 65 De Infanteria and Route 181. The main avenues inside the city are Ponce de Leon and Fernandez Juncos .

TOPOGRAPHY AND CIRCULATION





URBAN LAND USE PATTERN

AREAS
- RESIDENTIAL
- COMMERCIAL
- INDUSTRIAL

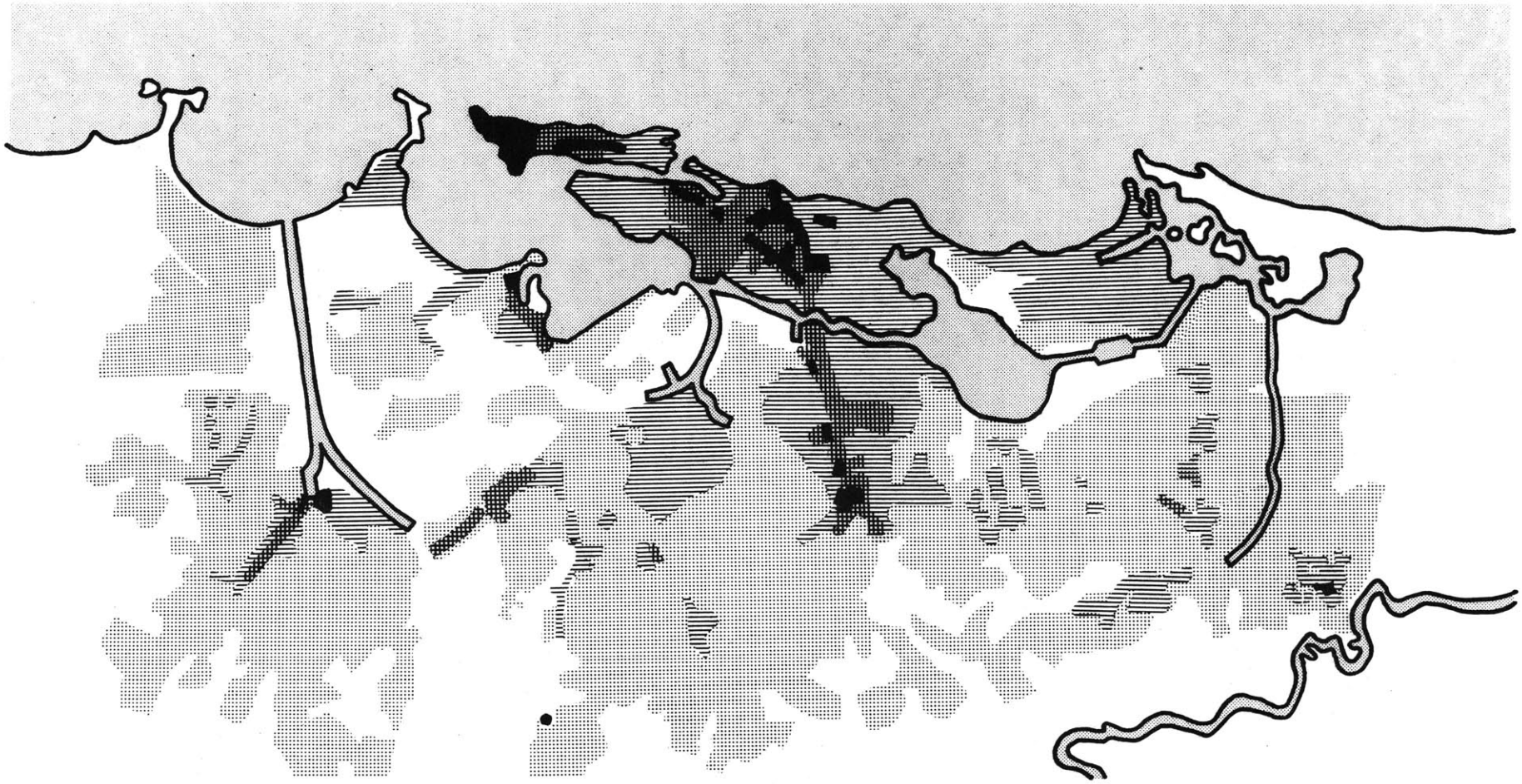
N

- (U) UNIVERSITY
- (H) HEALTH FACILITIES
- (P) PARKS/RECREATIONAL FACILITIES
- (A) AIRPORT

0 1 5Km

1:125000

LAND USE: The land use of Metropolitan San Juan reflects mainly three things: the influence of zoning and construction regulations, the influence of vehicular circulation, and the results of urban sprawl. Prior to 1950, most industrial/manufacturing facilities were near San Juan Bay. The planning directives of the 1950's dictated that the new manufacturing plants be displaced to accomodate the residential areas of the employees of the plants. The main commercial area in 1950 was the strip created around Ponce de Leon and Fernandez Juncos between San Juan and Rio Piedras. After 1950 with the new zoning ordinances, tract housing developments clientele, and the developing system of highways, zoned and regulated commercial areas grew around the main circulation strips, linearly or in shopping centers. Residential development prior to 1950 was mainly concentrated north of Caño Martin Pena, in the island of San Juan, around the commercial strip between San Juan and Rio Piedras, and around the other town. The rising economic mobility, accessible subsidized housing, easier vehicular circulation and the new planning directives fomented tract housing development and urban sprawl. This accounts for most of the residential areas to the west and south of the Bay, to the south of the Caño Martin Pena and to the southeast of the San Jose Lagoon.



URBAN GROWTH PATTERN

BEFORE 1900
1900 - 1920
1920 - 1950
1950 - 1977

0 1 5Km

1:125000

GROWTH: The growth of Metropolitan San Juan reflects the change in Puerto Rico from a rural society based on agriculture to an urban society based on manufacturing, and the population explosion in the twentieth century. Prior to 1900 the city was only urbanized within the walled city, parts of Puerta de Tierra, Santurce, Hato Rey, Rio Piedras, Caparra, and in the surrounding towns. Between 1900 and the 1920's, the city grew through accretion between Old San Juan and Rio Piedras around Ponce de Leon Avenue and the then existing railroad tracks. Prior to World War II, with the ever increasing rural urban migrations, the area of Santurce was saturated by squatter settlements in marginal lands and by speculative subdivisions. After 1950, due to new policies, most growth results from the great number of large scale housing developments and public housing projects and their complimentary, industrial, commercial and institutional facilities.

URBAN INCOME PATTERN

INCOMES
LOW
MEDIUM
HIGH

N

0 1 5Km

1:125000

ECONOMY: The San Juan Metropolitan Area is the richest and most important area, economically, in Puerto Rico. Though having only 30% of the population, it produces 59% of the income; it has 38% of the jobs, 60% of the commercial activity, 40% of the manufacturing activity and 50% of the government activity.

The per capita income of the city in 1975 was estimated to be $3,865 and the income per family was estimated to be $9,720. The total amounted in 1975 to $3.8 billion. In 1970, 46% of the families were below the established poverty level of $4,000, 36% were between $4,000 and $10,000, and 18% were above $10,000.

In 1970, 30.8% of the population of Metropolitan San Juan was employed. The official unemployment rate was 20%, but the real rate is approximately twice that. The principal generators of income in the city were commerce, government, industry and construction representing, respectively, 19%, 17%, 13% and 10% of the total income. In terms of the labor force, this implied 21% were in commerce 17% were in industry, 14% were in government, and 8 to 10% were in construction.

The pattern of income distribution in the Metropolitan Area reflect not income but also the dwelling environments of the area. The areas or municipalities which are mostly suburban tract housing developements, as in the case of the municipalities of Guaynabo and Carolina, are mostly high income. The areas where these type of developement mixes with semi-rural"barrios" or squatter settlements is mainly middle income as in the case of the municipality of Bayamon. Some areas which are economically depressed and composed of "barrios", squatter settlements and public housing, as in the case of Catano, are poor in income. The municipality of San Juan, though rich in source of income is mixed, due to the various types of residential environments

TYPOLOGY: Housing settlements in San Juan can be divided into five parts.

The first type is the Spanish-Colonial town laid out according to the Law of the Indies and composed of open recreational areas and matt contructed blocks of housing intermixed with commercial and institutional facilities.

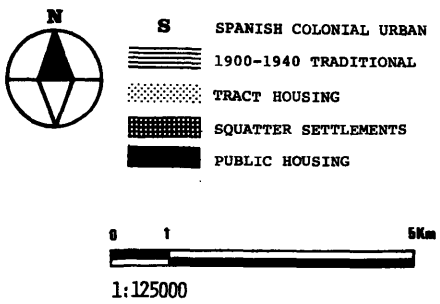
The second type is the squatter settlement of which there are basically two kinds: those started inside the city on marginal land during the depression years and those which started in the periphery after 1950. The first are now urban in quality, very dense and with complete infrastructure. The other are rural "barrios" with little infrastructure services.

The third type are those areas developed legally in San Juan between the World Wars. There are two types: those occurring around commercial strips and consisting of a mix of single story-detached house and apartment buildings and those composed of single story detached houses. Both followed designs based on speculation, rural traditions and Department of Health regulations.

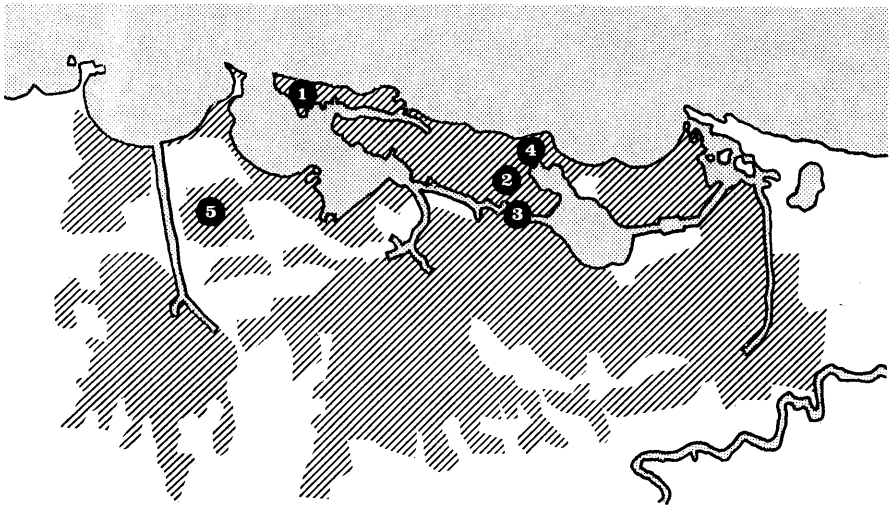
The fourth type are public housing projects. There are two kinds. Prior to the late 60's there were large projects composed of apartment buildings. After the late 60's a large number of projects were high rise buildings, as well as row and individual houses.

The fifth type are the tract housing developments which in Puerto Rico are called "urbanizaciones." They are single story, detached housing which follow F.H.A., Fm.H.A., V.A., and local planning standards. There are two kinds: instant developments for the middle classes, and site and services developments for the upper and lower classes.

URBAN RESIDENTIAL TYPOLOGY



CASE STUDIES



1 VIEJO SAN JUAN
SPANISH COLONIAL SETTLEMENT

2 EAST SANTURCE
TRADITIONAL URBAN BARRIO

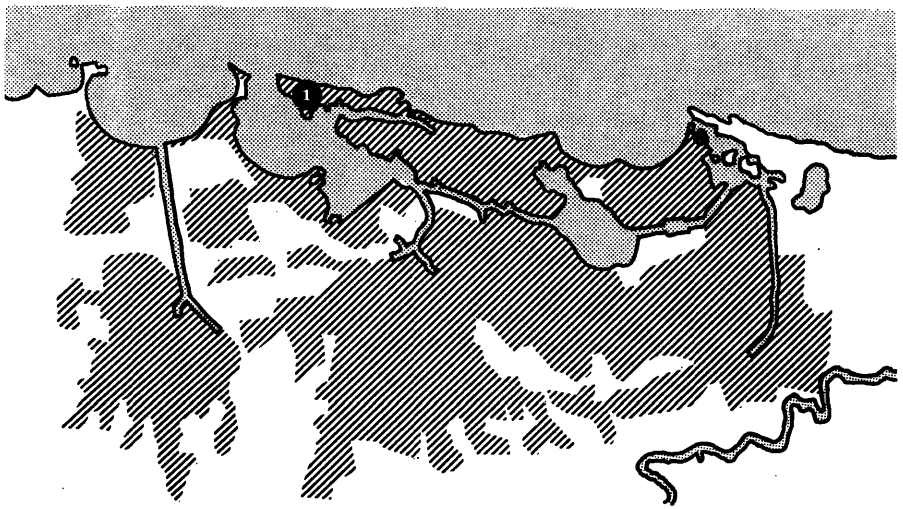
3 BUENA VISTA
SQUATTER SETTLEMENT

4 LUIS LLORENS TORRES
PUBLIC HOUSING PROJECT

5 LAS VEGAS
TRACT HOUSING DEVELOPMENT

VIEJO SAN JUAN

SPANISH COLONIAL SETTLEMENT



1 VIEJO SAN JUAN

LOCATION: Historical San Juan is located on the western end of the island of San Juan. To the north are the city walls, the La Perla squatter settlement and the Atlantic Ocean, to the south is San Juan Bay and the La Puntilla sector, to the west the grounds of El Morro Fortress and to the east Fort San Cristobal and Puerta de Tierra.

HISTORY: The city was founded in 1521, when the capital was changed fromthe interior of the island for economic, defense, and administrative reasons. It was laid out according to the Law of the Indies. The first part developed was the northwest sector around what is now Cristo Street. The city walls were laid out during the 16th Century in order to fortify the whole island of San Juan. The city reached saturation within these walls in the 17th century. During this time, the lots were subdivided many times and the buildings changed from makeshift structures to masonry structures, but it was not until the 19th century that the city acquired the character is retains today. With the American administration the city changed little until the start of the depression when poor people moved into units created from the dwellings of a middle/upper class which left the city. The city continued to deteriorate until the late 50's and early 60's when the possibilities of restoration were rediscovered, and young middle and upper class people began to move into the city.

SOCIO-ECONOMIC: In the first two and a half centuries of Spanish occupation, the economy was military oriented. This was reflected in the society by the differences between the military/ecclesiastical classes who ruled and the insular lower class who served them. By the mid 19th century, with the rise of agriculture and increased trade theposition of the military and the church was supplanted by a insular upper class whose economic interests and their main residences were in San Juan. The resulting mixture of employers and employees lasted until the 1930's depression when a large number of the upper and middle classes left the city, and additional poor people moved in, resulting not only in an economically depressed area but also in a rapidly shrinking population. This trend did not end until the early sixties when preservation and restoration of the city was begun and attracted people with higher incomes to the area.

The population today is low for an extensively reconstructed area. There is still great disparity between the low income families who live there and the upper income families who are now moving in. Of the former are many single people or elderly couples living in dilapidated tenements. In the latter there are many young singles or couples living in renovated apartments or houses. There are fewer families without young children than normal perhaps reflecting the lack ofacceptance of San Juan as an area to bring up children.

LAYOUT: The city is built on a sloping site. Its highest point lies in the northwest corner, meters above sea level. The city slopes toward the bay 5% north to south on its west edge, 5% west to east on its north edge, and 3% north to south on its east edge. The city, as specified in the Law of the Indies, is based on a grid of approximately 60 meter by 60 meter blocks, which the fall of the land and tenement development in the 16th and 17th centuries has corrupted in certain areas into rectangular blocks. The streets are narrow (9 meters) with narrow one meter sidewalks on both sides. The lots are the result of continuous progressive subdivision of the blocks and the result of need rather than definite codes.

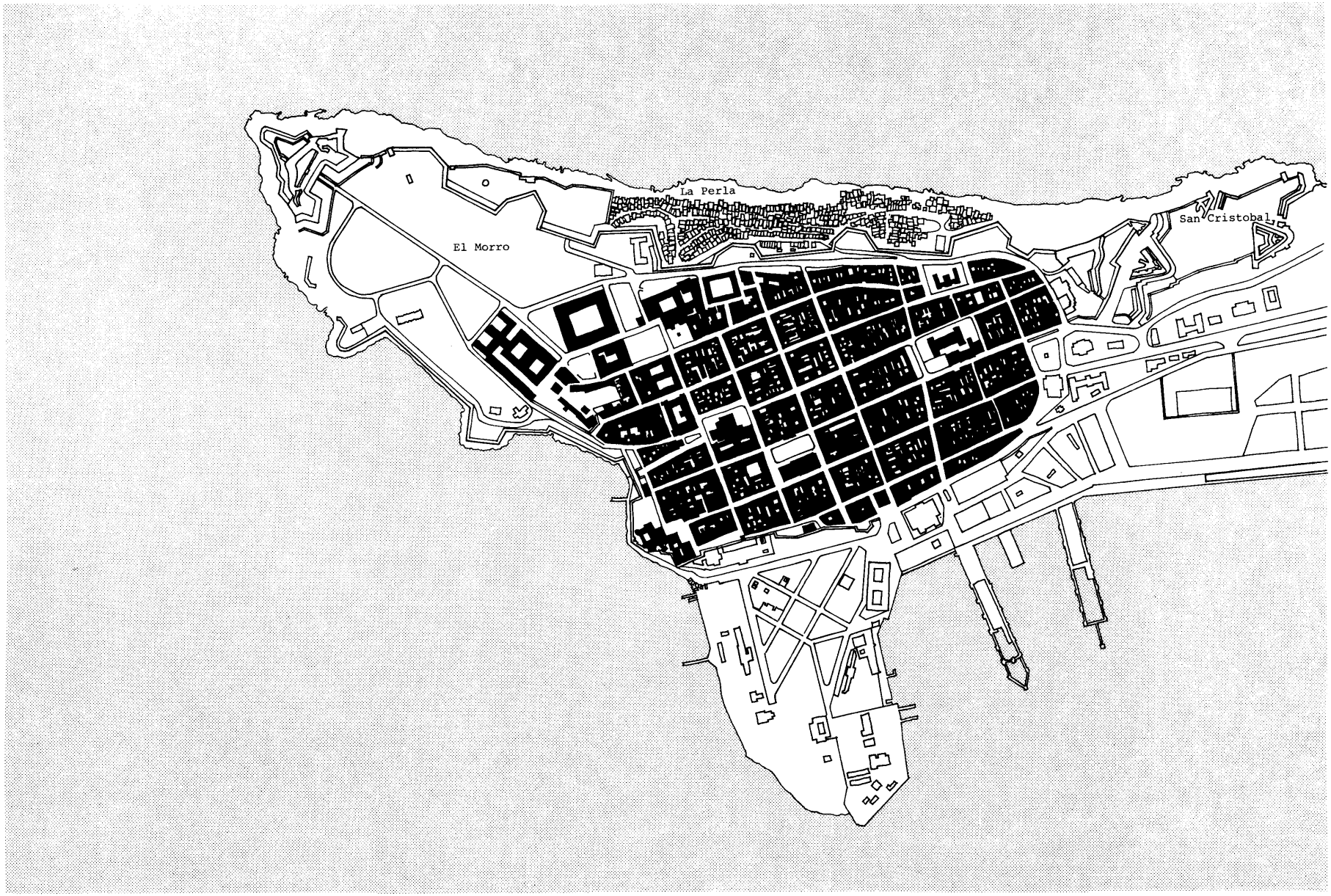
DWELLING: The buildings that abut the sidewalk are usually narrow and one to two stories. In general, buildings were built on two to four parallel masonry brick bearing walls, with wooden floors and wooden/masonry flat roofs. Facades were always masonry. There is usually an interior court created for light and ventilation. The interior subdivision of the unit is the result of the basic structural bays and a court. In the single family, single story unit, the living/dining facilities are usually found in the front of the unit facing the street. The sleeping area is usually in the back, parallel to or around the court. The bathroom and kitchen area usually in the middle or in the back. The two story houses follow the same pattern but make provisions for vertical access circulation and sometimes for commercial on the first floor. The houses are detailed in such a way to make the dwelling comfortable by the use of high ceilings, thick walls, shutter windows, and attached balconies.

LAND USE: San Juan is a very heterogenous area interms of land use. There is a large number of institutional facilities at the state and city level as well as a large number of private or public cultural facilities ranging from small galleries to large museums. There is excellent accessibility to recreational facilities ranging from parks and plazas within the city to large open parks on the periphery of the city. The commercial occurs at two levels. For the general and local public, it is located around the main streets of San Francisco, Fortaleza and Cristo. For the local community, the commercial is found in streets more accessible to the residences and is local in character (bars, markets, bakers, etc.). Mixed use also occurs within the same lots with commerce or institutions on the first floor and residences on upper levels or in the back of the lots.

CIRCULATION: Three main avenues begin or end on the southwest edge of the city: Ponce de Leon, Fernandez Juncos, and Baldorioty de Castro. The major streets within the city are the commercial streets of Fortaleza and San Francisco, which enter and leave the city east to west and run parallel to each other. The major secondary streets are: first, Cristo Street, a commercial/institutional street which runs north to south on the west of the city and intersects both Fortaleza and San Francisco; second, Norzagaray Avenue, a residential street on the north edge of the city; and third, Recinto Sur, a commercial street on the south-east edge of the city. There are also various"escalinatas", stair-stepped streets, as well as pedestrian alleys.

VIEJO SAN JUAN CASE STUDY SOURCES:

Plan:	*(accurate) Aerial Photo, DTOP, 1975.*
Land Use Pattern:	*(approximate) Zoning Maps, Planning Board, P.R., 1975 and Field Survey by author, 1977 and 1978.*
Circulation Pattern:	*(approximate) Volume Studies, DTOP, 1977 and Field Survey by author, 1977.*
Segment Plan:	*(accurate) Aerial Photo, DTOP, 1975 and Tax Maps, Department of the Treasury, 1975.*
Block Plan:	*(accurate) IBID.*
Typical Dwelling:	*(accurate) As Built Survey by others.*
Physical Data:	*(accurate) Census, U.S. Dept. of Commerce, 1970*
Socio-Economic Data:	*(accurate) IBID*
Photographs:	*by author*



LOCALITY PLAN

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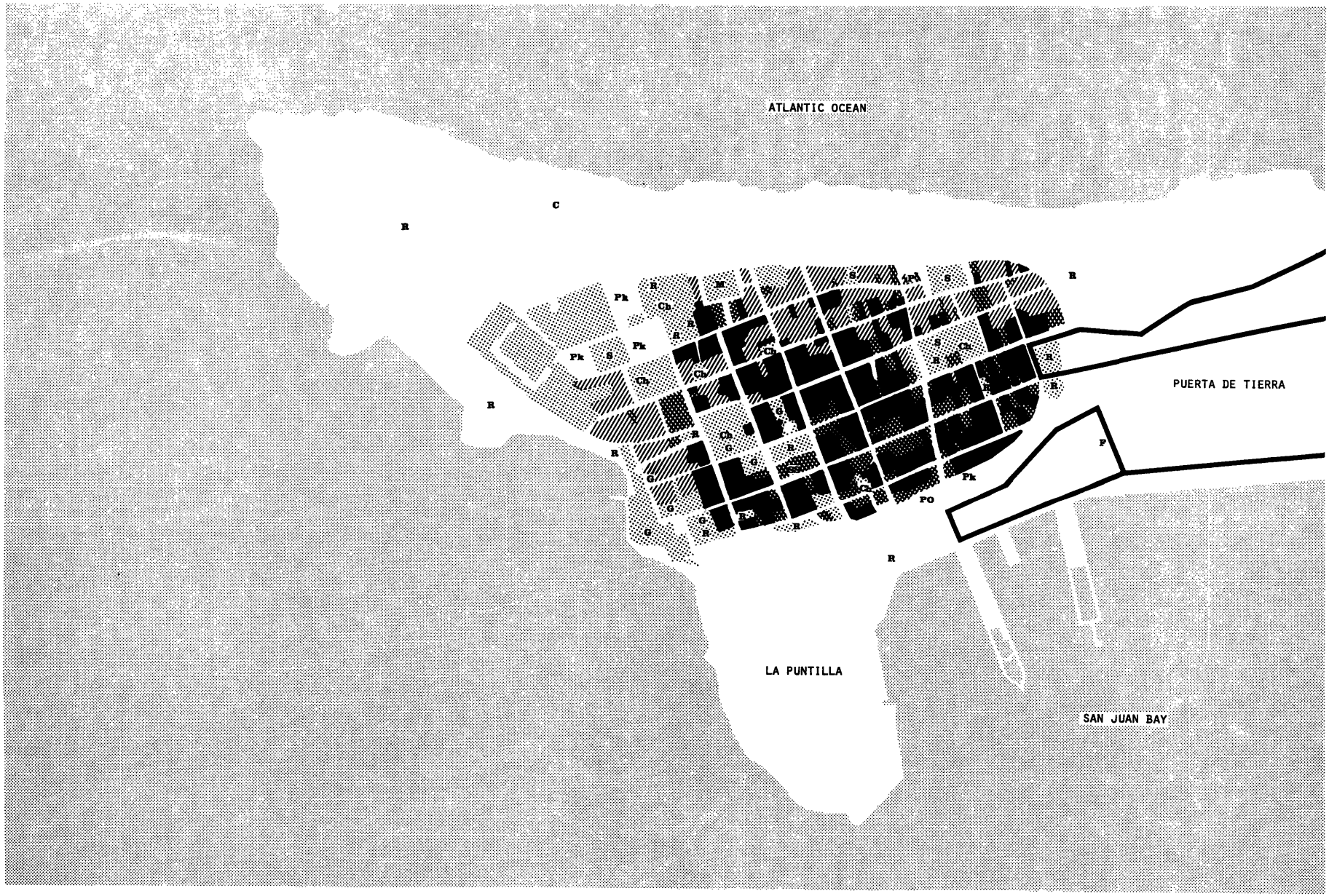


LOCALITY LAND USE PATTERN

0 100 500m

1:10000

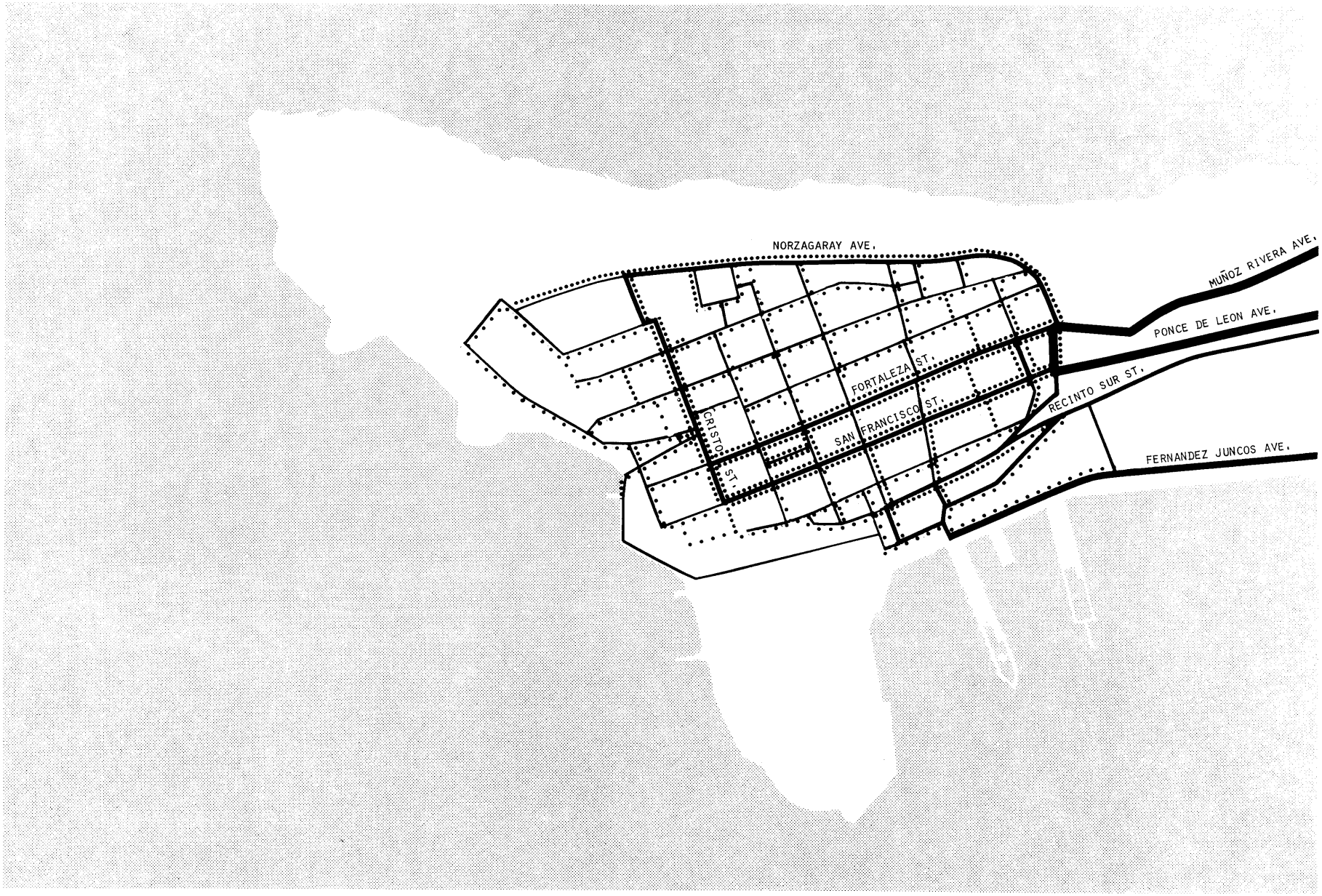
N

RESIDENTIAL
COMMERCIAL
RESIDENTIAL/COMMERCIAL
INSTITUTIONAL

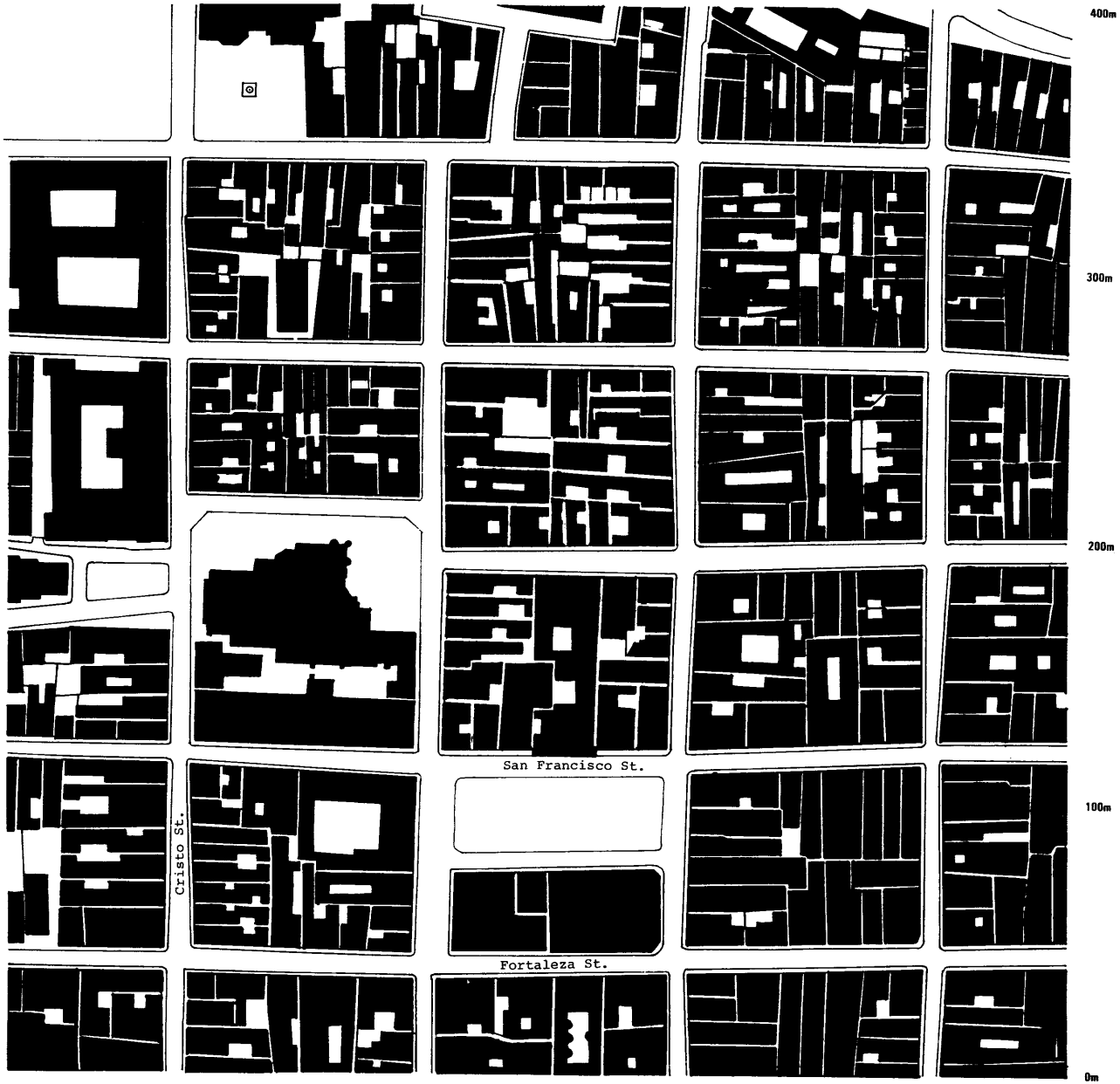
Pk Parking
P Police
F Fire Department
S School
Ch Church

SS Social Services
M Market
C Cemetery
U University
H Health

R Recreation
L Library
PO Post Office
G Goverment
Bus



LOCALITY CIRCULATION PATTERN

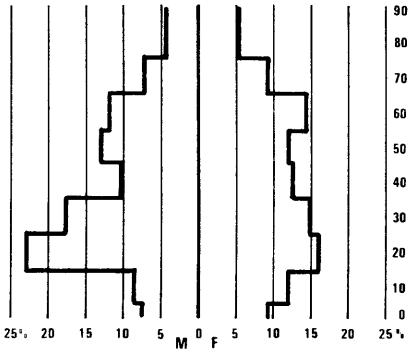


LOCALITY SEGMENT PLAN

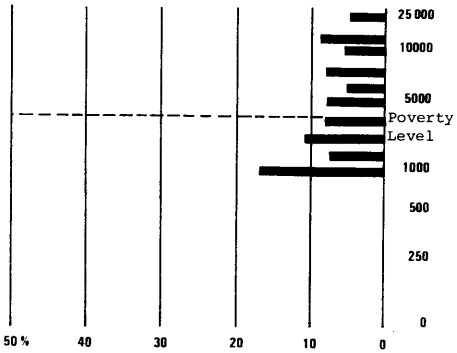
0 50 100 150m

1:2500

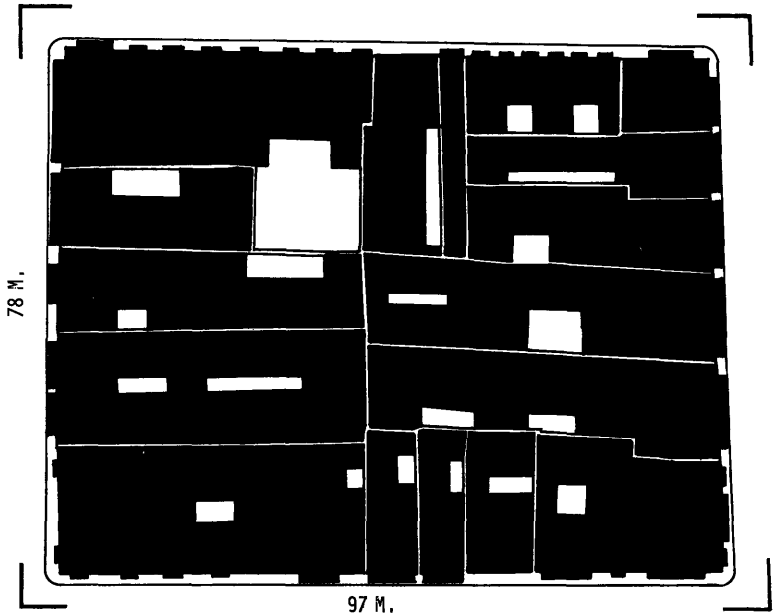
N



LOCALITY POPULATION DISTRIBUTION
horizontal: percentages vertical: ages
males: M females: F
Source: U.S.Census 1970



LOCALITY ANNUAL INCOME DISTRIBUTION
horizontal: percentages vertical: dollars
Source:U.S.Census 1970



LOCALITY BLOCK LAND UTILIZATION DATA

DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	17	.8	21.2
DWELLING UNITS	128	.8	159.6
PEOPLE	112	.8	139.6

AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	.18	24%
SEMI-PUBLIC (open spaces, schools, community centers)	-	-
PRIVATE (dwellings, shops, factories, lots)	.62	76%
SEMI-PRIVATE (cluster courts)	-	-
TOTAL	.8	100%

NETWORK EFFICIENCY

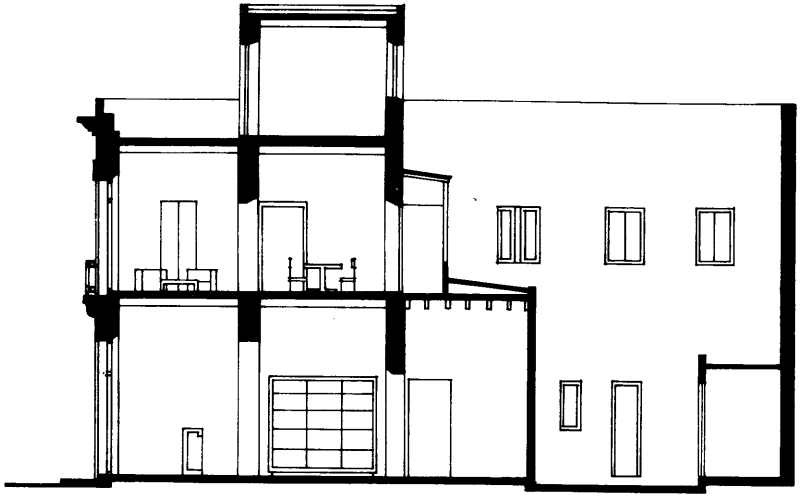
$\frac{\text{Network length (streets, walkways)}}{\text{Areas served (total area)}} = 450\text{M/Ha}$

LOTS

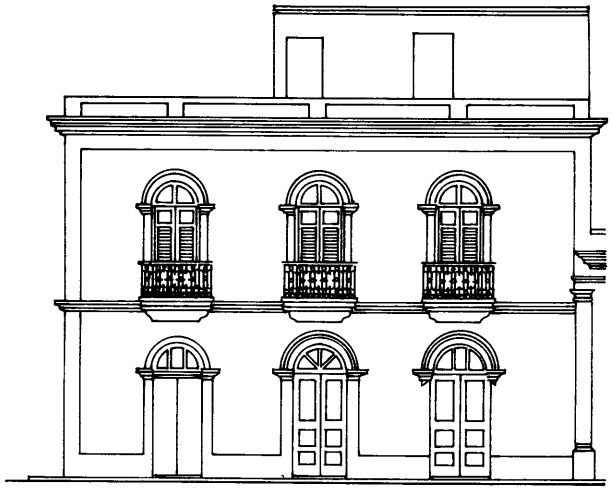
Average area, dimensions = 362 M^2

LOCALITY BLOCK PLAN

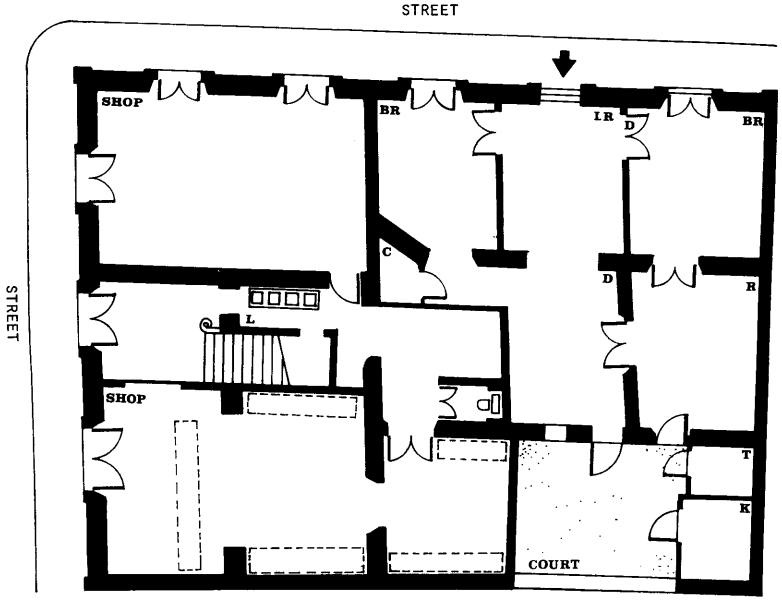
1:1000



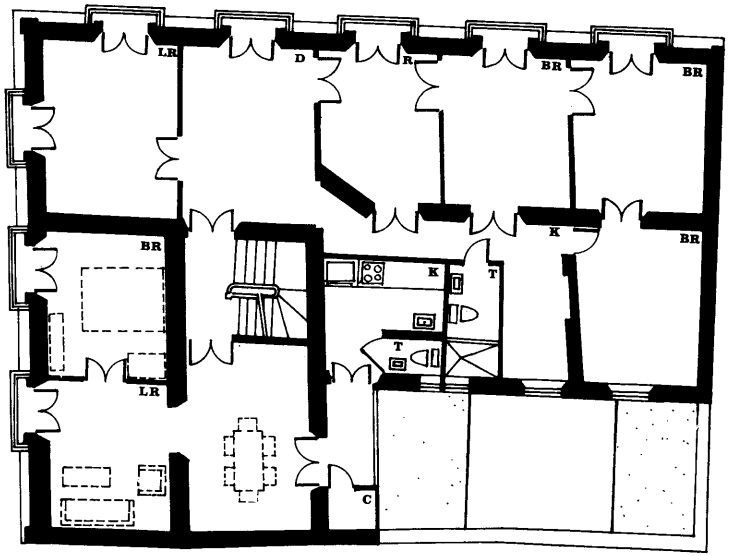
SECTION



ELEVATION



GROUND PLAN

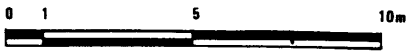


FIRST

KEY

LR	Living Room
D	Dining
BR	Bedroom
K	Kitchen
T	Toilet/Bathroom
L	Laundry
C	Closet
S	Storage
R	Room (multi-use)

TYPICAL DWELLING



1:200

PHYSICAL DATA
(related to dwelling and land)

DWELLING UNIT	
type:	ROOMS, APARTMENTS, HOUSES
occupied:	76.4%
ownership:	9.3%
rental:	90.7%
persons per living unit	
1:	41.5%
2:	24.3%
3,4:	24.1%
5 or more:	10.8%
median:	
LAND/ LOT	
utilization:	PRIVATE
tenure:	LEGAL RENTAL/OWNERSHIP
DWELLING	
location:	HISTORIC CITY CENTER
type:	ROW COURT HOUSE
units in structure:	
1:	30.3%
2:	5.9%
3,4:	16.9%
5 or more:	46.7%
utilization:	MULTIPLE/SINGLE: FAM./SINGLES
physical state:	DETERIORATED TO GOOD
DWELLING DEVELOPEMENT	
mode:	PROGRESSIVE
developer:	PRIVATE
builder:	SMALL CONTRACTOR/ARTISAN
construction types:	MASONRY/WOOD
year of construction	
1960-1970:	-
1950-1960:	-
1940-1950:	-
before 1940:	100%
DWELLING FACILITIES	
service connections	
water:	100%
sewer:	97%
electricity:	97%
individual services	
cooking facilities:	71.9%
plumbing:	31.0%
DWELLING UNIT PAYMENT	
cost of unit:	$27,900
financing:	BANK MORTG./ HIST. TAX EXEMPTION
payment per month:	$47 RENT
% of income	
income less than $3000:	35%+
$3000-$6000:	21.9%
$6000-$10000:	13.7%
$10000 or more:	13.3%

SOCIO-ECONOMIC DATA
(related to user)

GENERAL: SOCIAL	
user's ethnic origin	
native:	85.9%
native (foreign parents):	7.0%
foreign (born):	7.1%
education level	
none:	8.9%
elementary:	46.8%
high school:	29.2%
college:	17.0%
median:	8.5
FAMILY DATA	
number of families:	908
with children under 18:	36%
average family size:	3.9%
GENERAL: ECONOMIC	
employment source	
goverment:	16.5%
private:	12.7%
private(self-employed):	71.8%
employment type	
construction:	3.9%
manufacturing:	10.5%
transportation:	4.8%
community services:	2.2%
trade:	34.2%
finance:	4.8%
business:	2.7%
personal services:	10.4%
health:	2.6%
education:	9.9%
professional services:	3.4%
public administration:	8.4%
other:	2.4%
TRAVEL TO WORK	
mode	
car (own):	14.3%
car (others):	4.3%
bus:	27.1%
"publico":	2.2%
walking:	41.8%
work at home/ other:	10.3%
MIGRATION PATTERNS	
year moved	
1960-1970:	74.8%
1950-1960:	10.7%
before 1950:	14.5%

CONCLUSION

CONCLUSION: The oldest and smallest community of the five case studies, Viejo San Juan, holds a privileged position in the urban fabric of Metropolitan San Juan because it represents a settlement whose positive characteristics have not been matched anywhere else in the city.

Viejo San Juan is, at one level, a strictly planned city. The Law of the Indies stipulated certain conditions for the planning and building of colonial cities. This included a grid layout, open areas, definite types of streets, provision for civic and religious buildings as well as other provisions for the welfare of the inhabitants.

Viejo San Juan is an interpreted city. Changes were made in the grid to accommodate the slope of the land. The blocks were further subdivided into smaller lots: first in half, then in quarter and thereafter, in as many ways as possible, respecting, mainly, two things: lot frontage and a court house design. Land use followed the circulation sequence created by the interconnection of a series of plazas and civic/religious buildings as well as the needs of the community.

The physical community which exists at present is mostly 19th century but the character of the city reflects the 400 years of progressive development under Spanish rule. The grid, the cornerstone of colonial planning, defines now, as it did in the past, circulation, and through circulation, residential, commercial and institutional development. The narrow streets, though difficult for vehicular traffic, are "pleasant" areas to walk in, protected by the row buildings which abutt the sidewalks. The scale of the street also encourages community interaction due to the immediacy of the houses not only on the sides and back but also to the house opposite. The series of plazas and public buildings creates a series of sequences within the city which de facto encourages division of the city into 2 areas: one where the main commercial, institutional and recreational facilities are located, and one where it is mainly residential with local commercial and institutional facilities. The subdivision of the blocks and the development of the lots through the use of row, matt texture court housing has created a large variety of living units; from large, one to two stories one-lot houses, to apartment buildings. It has also encouraged mixed land use with the use of buildings for commercial and/or institutional purposes combined with the residential within the unit and/or within the block.

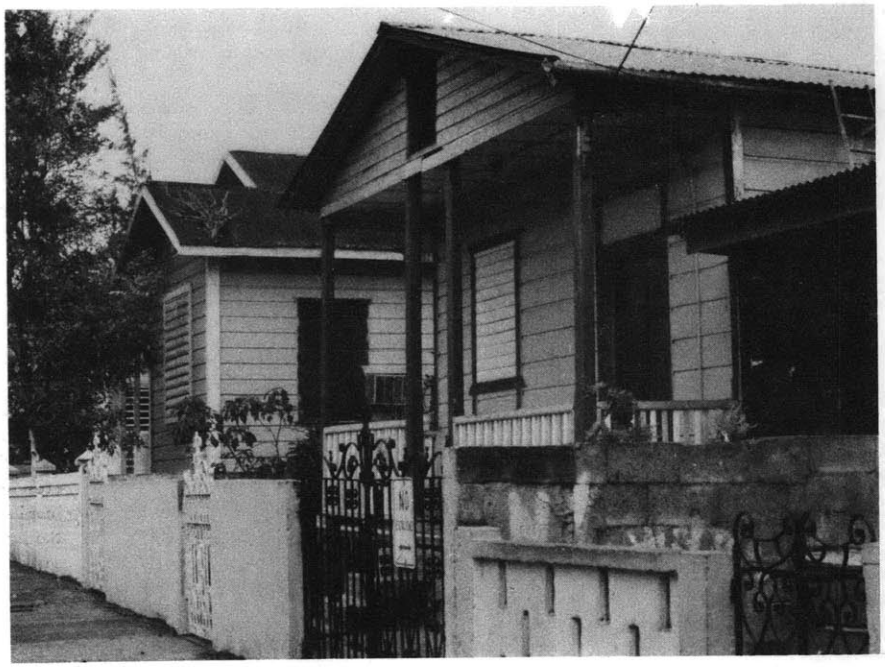
The problems of Viejo San Juan are not created by its physical plan but by recent, external pressures. The first of these problems, and definitely the most important, is the view of the city in the eyes of the policy makers. When, after 30 years of deterioration and neglect, Viejo San Juan was declared a historic zone worthy of restoration, a process of "mythicization" of the city was started. The idea of San Juan as a reflection of an on-going process was considered but was superseded by the idea of Viejo San Juan as an example of Spanish Colonial planning and architecture: a museum city. If restoration was to take place, it was within certain canons: canons which, with time, would become inflexible. In Viejo San Juan's restoration this meant that the 19th century form was to be the function and that "modern" design ideas, even in the unseen interiors, would not be tolerated. This was a great mistake in policy for it violated one of the most important tenets of the development of San Juan.

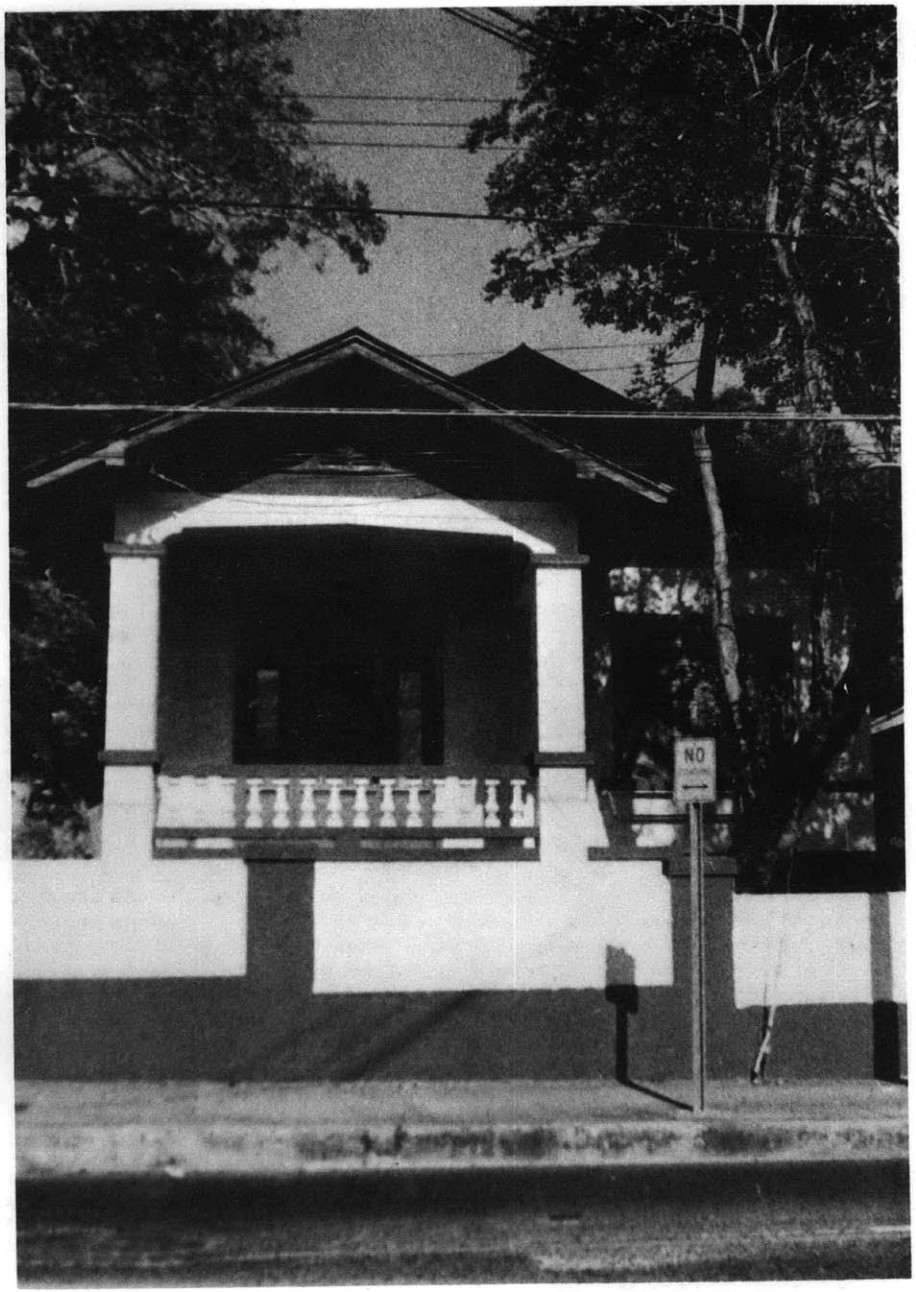
The second mistake was economic. Restoration of most buildings in the city guaranteed, if done according to the Restoration codes, a property tax exemption for a great number of years. The problem was that historical restoration was, and is, expensive; it requires a large initial amount of cash involvement, has little access to federally guaranteed mortgages, and is not considered a good risk by banks. Therefore, restoration was not accessible to the poor and middle class who lived in the city when the process was started. It was attractive to some of the upper classes who could afford it for their own use, or more frequently, for speculative apartment units. This in turn raised the price of the land and of rents driving many poor families out or into substandard dwellings.
Another problem is the automobile and the importance it has to the average family. Viejo San Juan is a pedestrian city. There are few buildings with provisions for automobiles, and there is little parking in the street. However, there are provisions for parking in the city edges but they are public and, in the eyes of many, too far away.

But the main problem confronting Viejo San Juan is the lack of identification of the modern Puertorrican lower/middle class with the lifestyle the city proposes. Brought up mainly after World War II on transplanted U.S. middle class values (tract housing developments, shopping centers, industrial parks, mass transportation, etc.) most can not or will not, identify with the city and the advantages and possibilities it offers once they are willing to accept is and develop it to respond to their needs of work, institutional services, commercial services, enjoyment and security.

San Juan offers great possibilities as a model for the development of other communities in the Metropolitan Area. The type of layout has the possibility of a high private to public ratio of infrastructure, costs in development and maintenance. The mixed land use, incorporating sources of labor as well as institutional, commercial and residential works better than the zoning system which now exists because at the community level it reduces the problems created by the automobile and foments neighborhoods where living, work, education, commerce, social welfare, and recreation mix on equal terms, in a cohesive way. The ratio of number of units to land is high in this type of layout, a fact enhanced by the varity of units and their potential for creating different economic residential markets within one small area. The type of units are responsive to high density, low rise development as well as to climate.

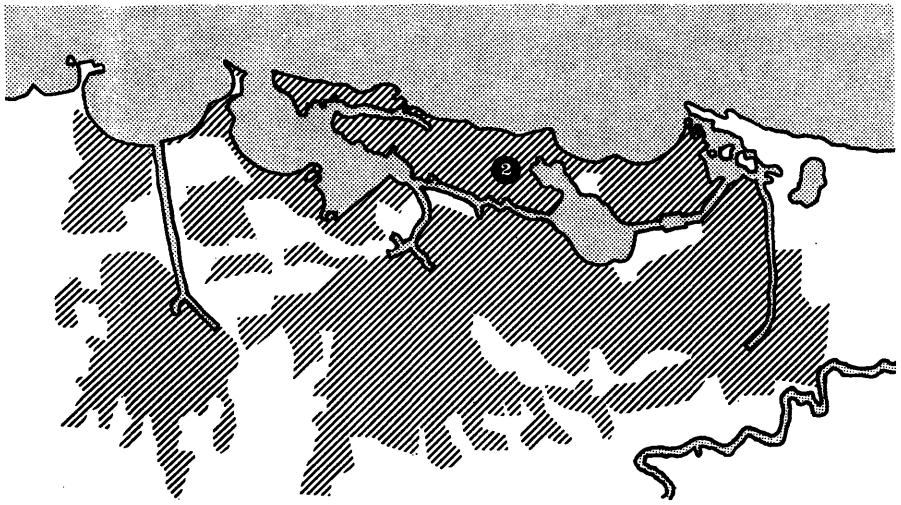
The problems of lifestyles which afflict Viejo San Juan could be solved. In the same way Metropolitan San Juan's lifestyle was changed in the fifties and sixties through planning and economics, the process could be reversed making the new/old lifestyle attractive; at first through economic or policy reasons (mortgages, sources of labor, zoning laws, etc.) but eventually, as it happened with tract housing, for social reasons (accessiblity and acceptability of local markets, social services, schools, parks, etc.).





EAST SANTURCE

TRADITIONAL URBAN BARRIO



2 EAST SANTURCE

LOCATION: East Santurce, commonly called Barrio Obrero, is composed of various barrios: Pulguero, Chicharo, Seboruco, Loiza, Villa Palmeras, Herrera, Shanghai, Merhoff, Maria Moczo, Las Palmas, Monteflores and Barrio Obrero itself. The area is cohesive as a unit mainly through its residential, "barrio" character. The area is bordered to the west by the Sagrado Corazon College, San Jorge Street and the western part of Santurce, to the east by the Las Casas housing project and the San Jose Lagoon, to the north by Baldorioty de Castro Avenue, and to the south by the meshing boundaries of Rexach Street and the Cano Martin Peña settlements.

HISTORY: East Santurce represents, at its center, some of the first attempts by the private sector to capitalize on the problem of the rural immigrants of the 20's and 30's. Until the 1920's, the area was used for agro-pecuniary and recreational pruposes. After World War I there were some squatter settlements in the area. Between the 30's and 40's part of the land was subdivided for speculative reasons into regular rectangular blocks, which were lotified, provided with minimum infrastructural services, and sold. The families in turn constructed their homes, usually single story, based on their rural background and on guidelines set by the Health Department. This created a series of detached, mostly single story, wood houses whose character the whole area still retains.

SOCIO-ECONOMIC: During the first decades of the area's development a great number of the people who lived in the area were first generation immigrants who were of a higher economic position than those living in the squatter slums and who could buy a property and were more easily absorbed into the new urban economy. Prior to World War II, the area became the main stepping stone into the city for the immigrant rural poor who could afford to buy a house. By the 1940's the area was physically saturated, the barrios were well consolidated as communities, and immigration into the area decreased. The present socio-economic character of the area still reflects the initial development. Mainly poor, middle class in character, the area nevertheless is represented by all the economic classes which are usually mixed within the individual "barrios." The social profile also presents great heterogeny. There is a tendency, following Puertorican tradition, for the extended family to stay in the area nad this can be seen in the variety of age groups intermixed in the community.

LAYOUT: The area is built on the side of a hill, its highest point meters above sea level and slopes 4% to the Northern coastal plains, 5% to the Southern marsh plain. Most of the area is subdivided into a regular gridiron composed of rectangular blocks varied according to the slope of the land, the sqatter settlements, and some public and semi-public areas. The blocks are subdivided into lots back to back. The streets are narrow and have narrow sidewalks on both sides.

DWELLING: The older houses, as well as some of the newer ones, follow the patterns established in the 20's and 30's by the Health Department, the developers and the rural-urban tradition, in terms of setbacks, type of house and construction methods. The house sits on a lot setback one to two meters from the front, one meter from the side and 2.5 meters from the other side. The house is on a raised foundation. A two bay, column system divides the house into zones: the living zone (porch, living/dining) and the sleeping zone (bedrooms). The kitchen and bathroom are usually in the back of these areas. Most houses were originally built of wood (stud wall construction), tongue and groove floors, walls and ceilings) with a concrete porch, a corrugated galvanized iron ("zinc") roof and wood fenestration and doors. A great number of the houses are now in concrete and follow the established prototypes set by Federally guaranteed mortgages' minimum standards.

LAND USE: The land use of East Santurce is heterogenous in terms of scale and distribution but somewhat deficient in terms of type. The main commercial facilities are lcoated on Borinquen Avenue in the south of the area. The secondary commercial facilities are along Eduardo Conde Avenue, Barbosa Street, Puerto Rico Street, Degetau Street and Tapia Street. There is also a great number of small scale commercial activities and establishments at the street level. The main institutional facilities, other than schools and churches, are a community center a hospital, a dispensary, a post office, a police station, a fire station, a cemetary, as well as various social services centers. There is only one established recreational area, Plaza Barcelo, which borders Borinquen Avenue in the south of the area. There are some manufacturing and industrial plants bordering Barbosa Avenue on the west and Baldorioty de Castro Avenue on the north.

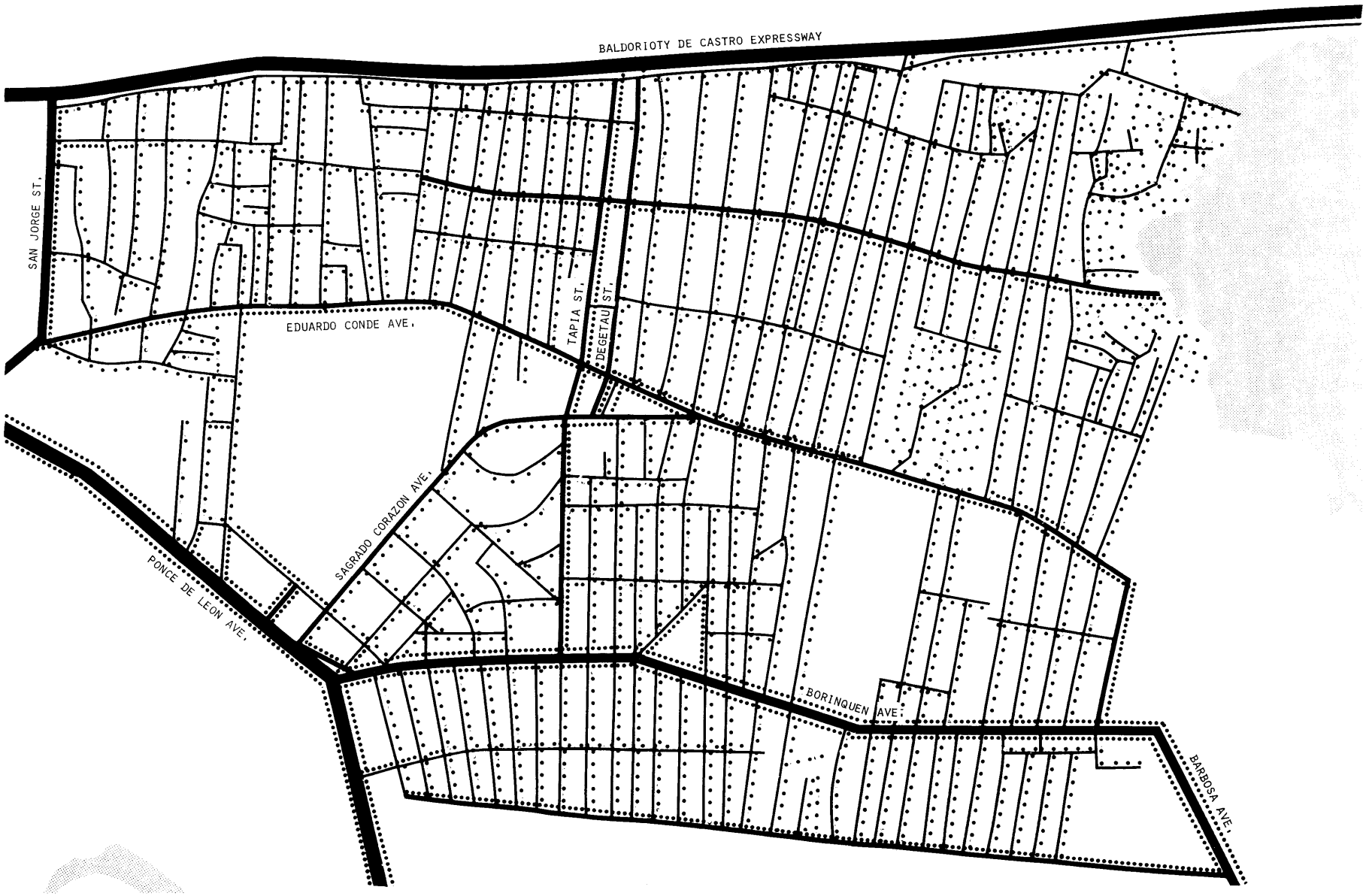
CIRCULATION: The area is flanked by two highways. To the southwest is Ponce de Leon, the collector avenue between San Juan, Hato Rey, Rio Piedras and the south of the island. To the north is Baldorioty de Castro, a highway linking the center of the city to the east of the island. Inside the area the main circulation avenue is Avenida Borinquen which runds eat to west and is directly connected to Ponce de Leon on the west and to Barbosa Avenue on the east. The second most important street is Eduardo Conde Avenue which runs parallel to Borinquen Avenue, bisects the area in half and is also connected to Ponce de Leon. There are various secondary streets, particularly Sagrado Corazon, Degetau, and Tapia, which run north to south and connect Ponce de Leon and Baldorioty de Castro.

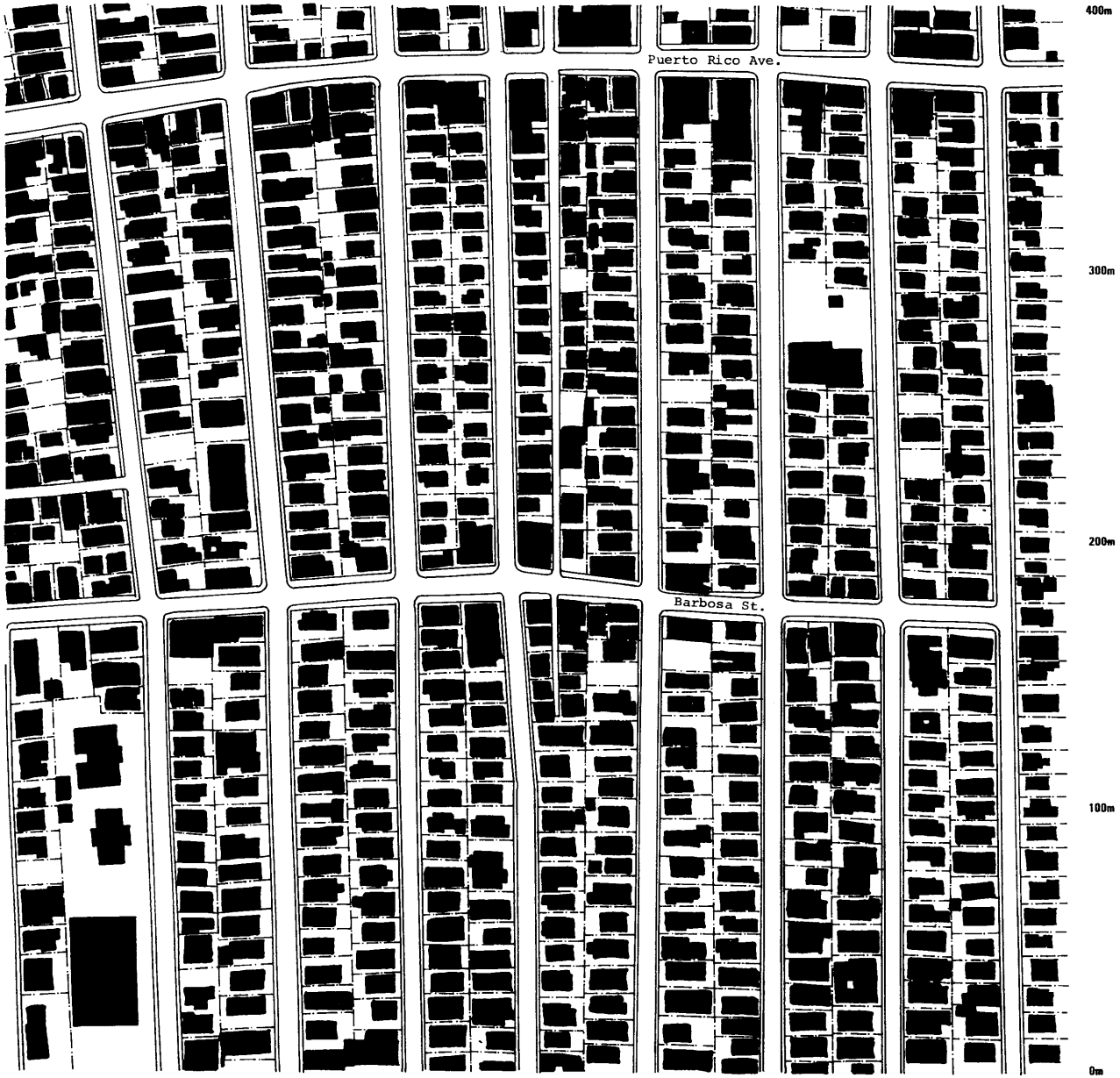
EAST SANTURCE CASE STUDY SOURCES:

Plan:	*(accurate) Aerial Photo, DTOP, 1977.*
Land Use Pattern:	*(approximate) Zoning Maps, Planning Board, 1975 and Field Survey by author, 1977 and 1978.*
Circulation Pattern:	*(approximate) Volume Studies, 1977 and Field Survey by author, 1977.*
Segment Plan:	*(accurate) Aerial Photo, DTOP, 1977 and Tax Maps, Department of the Treasury, 1975.*
Block Plan:	*(accurate) IBID.*
Typical Dwelling:	*(accurate) As built survey by author, 1977.*
Physical Data:	*(accurate) Census, U.S. Dept. of Commerce, 1970*
Socio-Economic Data:	*(accurate) IBID.*
Photographs:	*by author.*

LOCALITY PLAN


BARRIO LOIZA
LUIS LLORENS TORRES
SAN JOSE LAGOON
WEST SANTURCE
LAS CASAS
BUENA VISTA
LOCALITY LAND USE PATTERN
0 100 500m
1:10000
N
RESIDENTIAL
COMMERCIAL
INDUSTRIAL
INSTITUTIONAL
Pk Parking
P Police
F Fire Department
S School
Ch Church
R Recreation
L Library
U University
H Health
PO Post Office
SS Social Services
M Market
C Cemetery
Bus


BALDORIOTY DE CASTRO EXPRESSWAY
SAN JORGE ST.
EDUARDO CONDE AVE.
TAPIA ST.
DEGETAU ST.
SAGRADO CORAZON AVE.
PONCE DE LEON AVE.
BORINQUEN AVE.
BARBOSA AVE.
N
LOCALITY CIRCULATION PATTERN
0 100 500m
1:10000
VEHICULAR
PEDESTRIAN

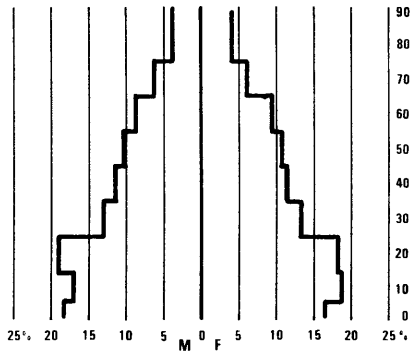


LOCALITY SEGMENT PLAN

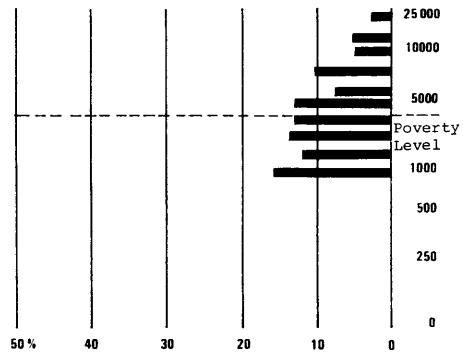
0 50 100 150m

1:2500

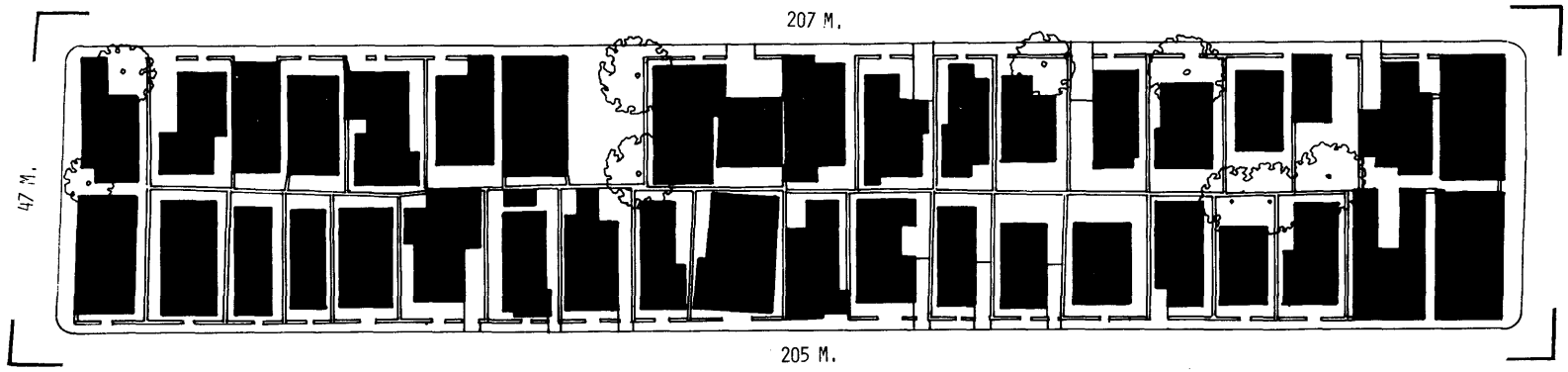
N



LOCALITY POPULATION DISTRIBUTION
horizontal: percentages vertical: ages
males: M females: F
Source: U.S. Census 1970



LOCALITY ANNUAL INCOME DISTRIBUTION
horizontal: percentages vertical: dollars
Source: U.S. Census 1970



LOCALITY BLOCK LAND UTILIZATION DATA

DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	40	.92	43.3
DWELLING UNITS	45	.92	48.7
PEOPLE	282	.92	305.2

AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	.24	26%
SEMI-PUBLIC (open spaces, schools, community centers)	-	-
PRIVATE (dwellings, shops, factories, lots)	.68	74%
SEMI-PRIVATE (cluster courts)	-	-
TOTAL	.92	100%

NETWORK EFFICIENCY

$\frac{\text{Network length (streets, walkways)}}{\text{Areas served (total area)}}$ = 547M/Ha

LOTS

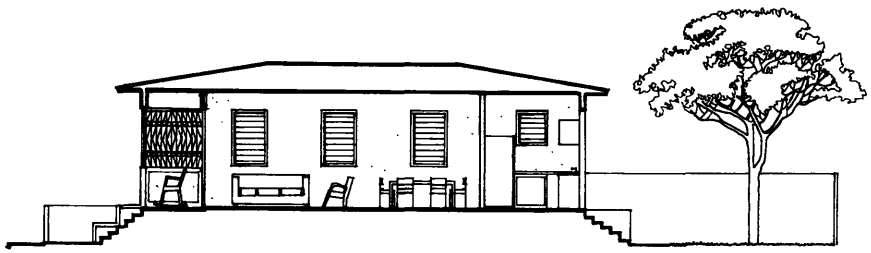
Average area, dimensions = 175 M^2

LOCALITY BLOCK PLAN

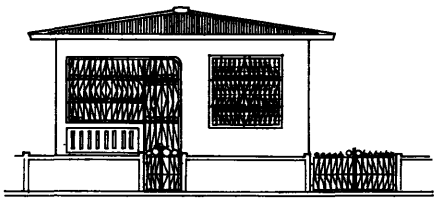
N

0 10 50m

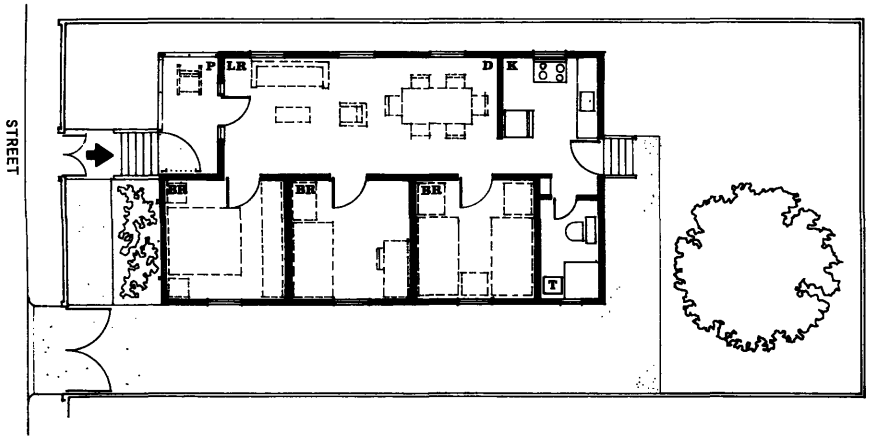
1:1000



SECTION



ELEVATION



PLAN

TYPICAL DWELLING

0 1 5 10m

1:200

LR Living Room
D Dining
BR Bedroom
K Kitchen
T Toilet/Bathroom
L Laundry
C Closet
S Storage
R Room (multi-use)

PHYSICAL DATA
(related to dwelling and land)

DWELLING UNIT	
type:	INDIVIDUAL HOUSES
occupied:	93.0%
ownership:	43.0%
rental:	57.0%
persons per living unit	
1:	16.6%
2:	22.1%
3,4:	36.1%
5 or more:	25.0%
median:	
LAND/ LOT	
utilization:	PRIVATE
tenure:	LEGAL RENTAL/OWNERSHIP
DWELLING	
location:	CITY CENTER
type:	DETACHED HOUSE
units in structure:	
1:	74.4%
2:	12.7%
3,4:	8.7%
5 or more:	4.2%
utilization:	SINGLE FAMILY
physical state:	FAIR TO GOOD
DWELLING DEVELOPEMENT	
mode:	PROGRESSIVE
developer:	PRIVATE
builder:	ARTISAN/SMALL CONTRACTOR
construction types:	WOOD AND/OR CONCRETE
year of construction	
1960-1970:	7.3%
1950-1960:	17.7%
1940-1950:	26.6%
before 1940:	48.4%
DWELLING FACILITIES	
service connections	
water:	99.2%
sewer:	78.5%
electricity:	94.2%
individual services	
cooking facilities:	96.0%
plumbing:	25.0%
DWELLING UNIT PAYMENT	
cost of unit:	$12,170
financing:	BANK MORTGAGE
payment per month:	$58 RENT
% of income	
income less than $3000:	35%+
$3000-$6000:	24.1%
$6000-$10000:	13.0%
$10000 or more:	10.0%

SOCIO-ECONOMIC DATA
(related to user)

GENERAL: SOCIAL	
user's ethnic origin	
native:	96.5%
native (foreign parents):	1.0%
foreign (born):	6.8%
education level	
none:	18.6%
elementary:	60.6%
high school:	19.6%
college:	1.2%
median:	5.2
FAMILY DATA	
number of families:	4240
with children under 18:	56.7%
average family size:	4.5
GENERAL: ECONOMIC	
employment source	
goverment:	19.0%
private:	10.0%
private(self-employed):	71.0%
employment type	
construction:	12.6%
manufacturing:	16.0%
transportation:	6.5%
community services:	3.7%
trade:	22.9%
finance:	2.2%
business:	5.7%
personal services:	9.6%
health:	5.5%
education:	4.0%
professional services:	1.8%
public administration:	6.7%
other:	2.1%
TRAVEL TO WORK	
mode	
car (own):	17.0%
car (others):	3.8%
bus:	52.0%
"publico":	2.8%
walking:	17.3%
work at home/other:	7.1%
MIGRATION PATTERNS	
year moved	
1960-1970:	65.1%
1950-1960:	12.5%
before 1950:	22.4%

CONCLUSION

CONCLUSION: Since it reached saturation in the 1940's, East Santurce has largely been ignored in terms of the Metropolitan Area. Nevertheless, it is an important area in terms of development because it is a prime example of a legal, low income community developed between World Wars I and II, and because, in terms of the four cases discussed here that were built in the twentieth century, it was the one most flexibly developed.

Unlike Viejo San Juan, which is a progressively developed city based on a legal planning framework, East Santurce is an area progressively developed on a gridiron layout designed mainly for speculative reasons with little government intervention.

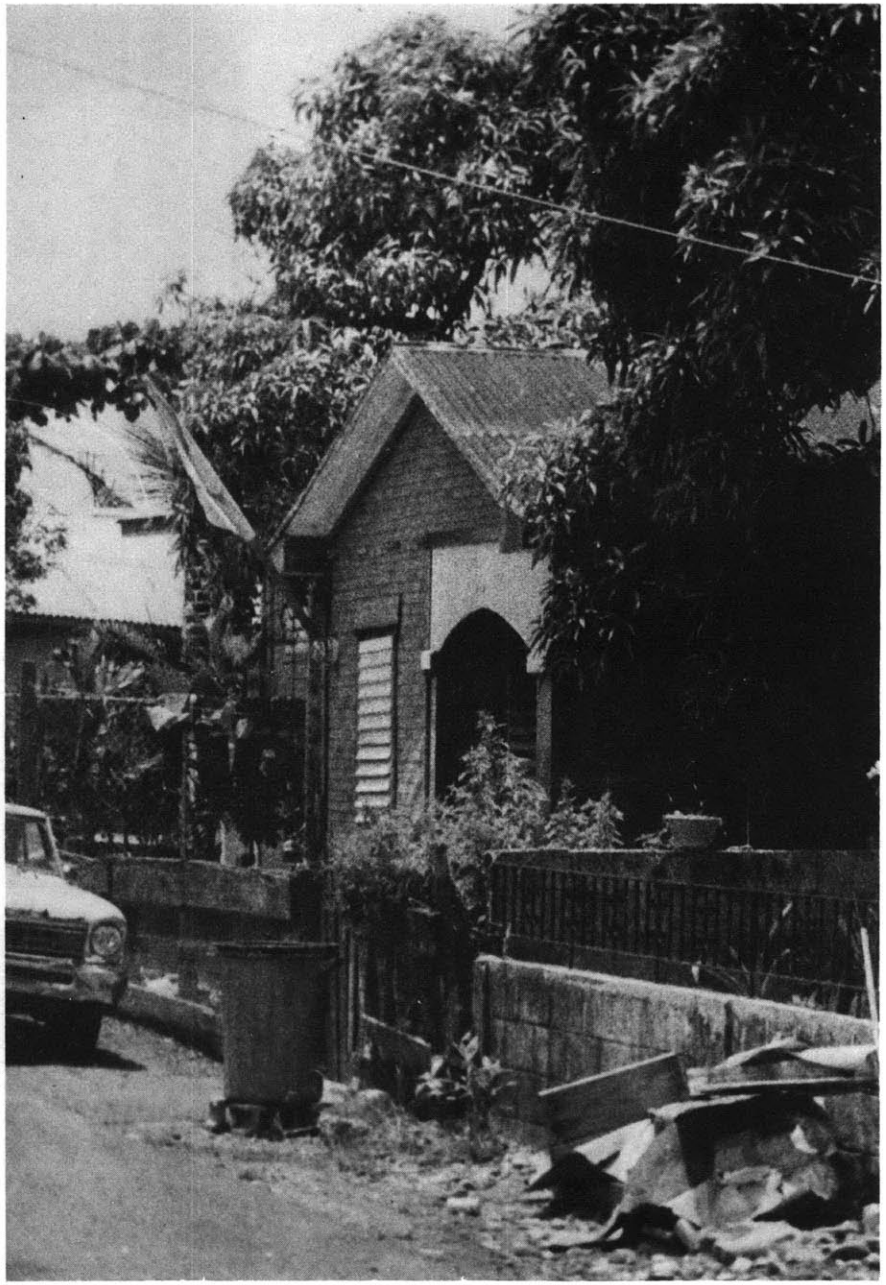
Though not as effective as the San Juan grid and somewhat inefficient in terms of infrastructure, the gridiron design encourages circulation particularly pedestrian. The narrow streets, although poor for vehicular traffic, are pleasant to walk in and are conducive, due to the lot and sidewalk placement, to community development between both sides of the street. The houses themselves are not as rich as those of San Juan in terms of type but the forms are indigenous and cheap to construct. The land use is heterogenous because it caters to the public at various scales, from the immediate block facilities, such as grocery stores, to the main commercial strip with large scale services, such as large stores and government social services, offices, and because the zoning which exists came after the area had been developed and thus reflects rather than anticipates land use. But the most important aspect of modern East Santurce are the people. Of all the case studies, East Santurce is the most heterogenous in terms of income and in terms of age, perhaps reflecting the desire of the extended family to stay in the community.

Nevertheless, East Santurce has problems reflecting the laissez-faire character of the original planning and the speculative design of the area.

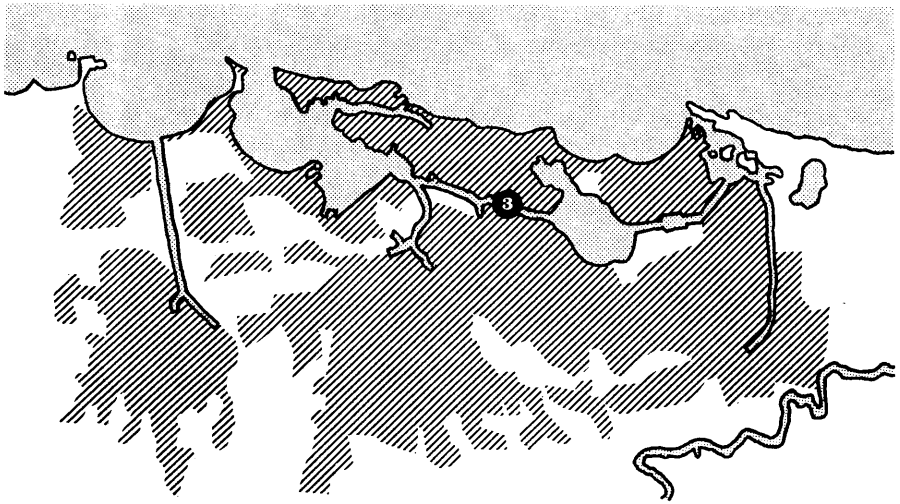
The first problem is the inflexibility of the gridiron block, the back to back lot layout, and the required setbacks of the units in the lot. This creates blocks with a detrimentally homogenous character only capable of subdivision or growth in a limited way.

The second problem is the size of the blocks and the detrimental effect this has on network efficiency and maintenance.

But the most important problem the area has is the lack of foresight in providing open areas such as a plaza or civic buildings to give a focus of interest for the individual barrios which form the area, and create, through the interconnection of these spaces and buildings, a sequence of spaces to bind the area as a whole as they do in Old San Juan.



BUENA VISTA
SQUATTER SETTLEMENT



3 BUENA VISTA

LOCATION: Buena Vista I and Buena Vista II are located in the center of Metropolitan San Juan, between the southern edge of East Santurce and the northern edge of Hato Rey. It is bound on the north by Rexach Avenue and Barrio Obrero, on the south by Quisquella Avenue and Hato Rey, on the east by Barbosa Avenue (Carpenters' Road) and various squatter settlements, and on the west by Ponce de Leon Avenue and the Hato Rey business district. The area is divided by a canal, Caño Martin Pena, which runs from the bay on the west to the San Jose lagoon on the east.

HISTORY: The communities are two of the many squatter settlements which sprouted around the Caño Martin Pena between the two World Wars as a result of land invasions. The invaded land was usually public land with poor soil Marshy and floodable due to its location. Land subdivision was by accretion or by crude imitative block and lot subdivision. Ignored at first after World War II, the government decided to eradicate these settlements and move the inhabitants to public housing. But the magnitude of the problem coupled with the reluctance of the inhabitants and their efforts through cooperative and political pressure, and changing theories resulted only in the partial eradication of the squatters. In 1973, all squatter settlements created prior to that year and not on land zoned for other purposes, were legalized by giving the inhabitants title to their land. Throughout the years, due to political pressure, the inhabitants have been given partial infrastructural services. At present, the two Buena Vistas represent the various situations of the Caño Martin Pena communities. The north sector, Buena Vista I, is under the threat of eradication because the area is zoned for a super highway. The people of the south sector, Buena Vista II, have title or right to the title of their land. There exists a vigorous cooperative movement in the community which is slowly (it started in the 1940's) upgrading the area, west to east, to qualify for aid and full infrastructural services.

SOCIO-ECONOMIC: The settlements since the beginning have been the first stepping stone for poor people who want to move into the city but cannot afford to buy land or private units, and are unwilling or unable to enter public housing. The people are poor; 70% are under the official poverty level. A great number are a part of extended families or close groups which have been living in the same area for a long time. They have, second to public housing, the highest number of children under 18 per family. Their education level is also second to public housing the poorest in the city. Only 40% of the inhabitants over 18 have completed primary school. Nevertheless within their physical boundaries, they are two of the most cohesive communities in the metropolitan area, a fact frequently expressed by their reluctance to move to public housing.

LAYOUT: The two communities are built on the flat marshy land which lies on either side of the Cano Martin Pena. There are different layouts on either side of the canal. In the north community (Buena Vista I) the streets, on the west, follow their grid of Barrio Obrero to form long blocks; on the east, they collide with streets entering perpendicularly from Barbosa Avenue to create irregular rectangular blocks. In the community on the south side (Buena Vista II) the layout is forced by Ponce de Leon Avenue and Barbosa Avenue. From these avenues, the main streets of the settlement develop, creating in the process irregular rectangular blocks, mostly lying east to west. The lot subdivision is generally irregular, small, back to back lots, except where the urbanization occured through imminent domain design.

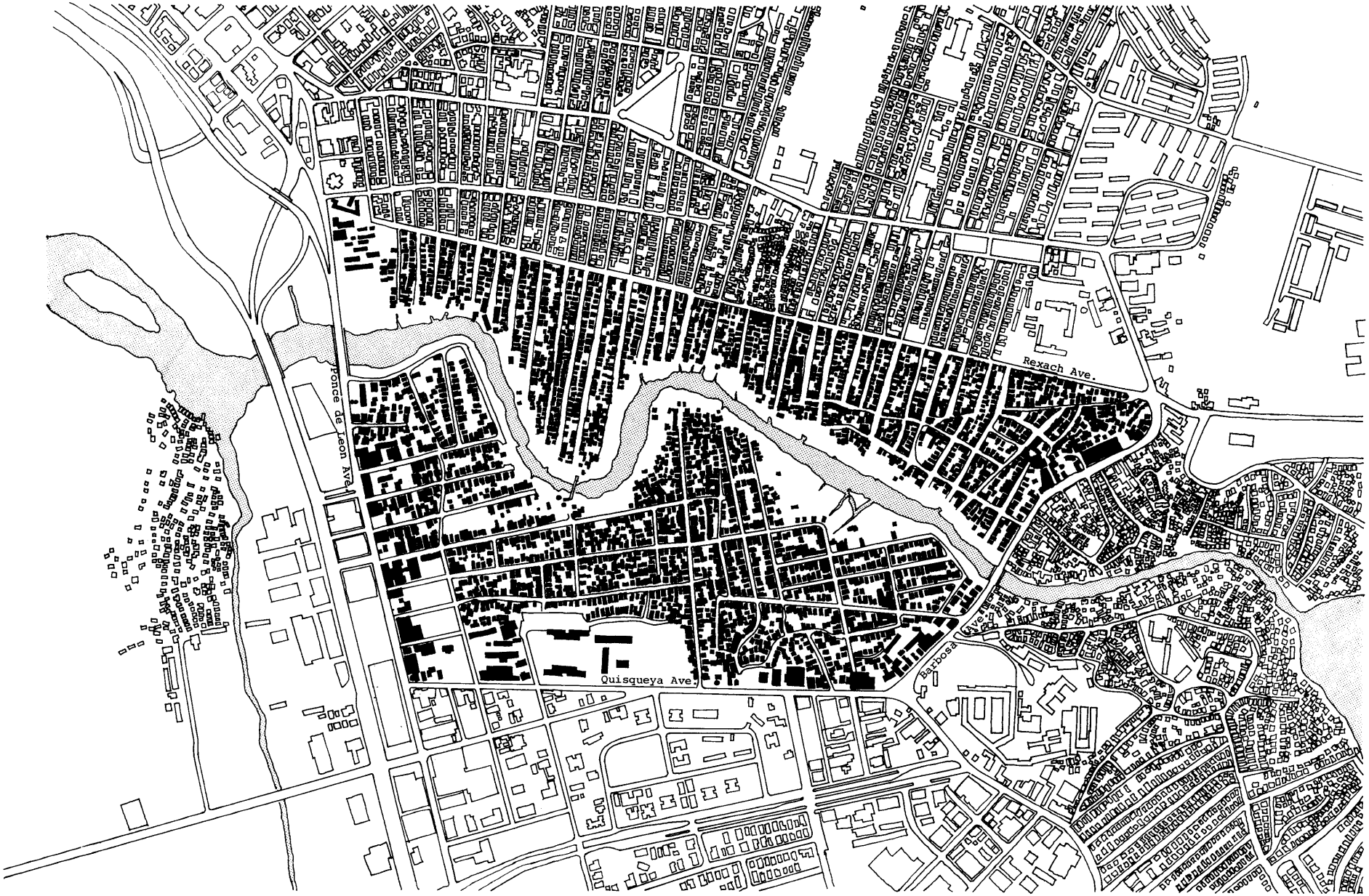
DWELLING: Most of the houses in the Caño began as shanties but, with time, were improved according to the patterns established in East Santurce, not through obligation but through imitative desire. The houses are usually set back on the front and sides, but the set back is usually irregular. The houses themselves are on wooden platforms, stud wall construction with tongue and groove floors and walls, and galvanized iron "zinc" roofs, but are smaller than those in East Santurce, and often lacking interior services.

LAND USE: The use of the land reflects the type of community as well as its physical layout. The main commercial areas are on the periphery of the two communities: in Rexach Avenue, Ponce de Leon Avenue, Barbosa Avenue, and Quisquella Street. Only small local scale commercial is found in the interior of the communities. Apart from schools,

CIRCULATION: The area is bordered by two major avenues, Ponce de Leon Avenue to the west, and Barbosa Avenue to the east, as well as two minor avenues, Rexach Avenue to the north, and Quisquella Avenue to the south. Ponce de Leon, Barbosa and Quisquella Avenue contain public transportation. There are no major vehicular streets inside the community.

BUENA VISTA CASE STUDY SOURCES:

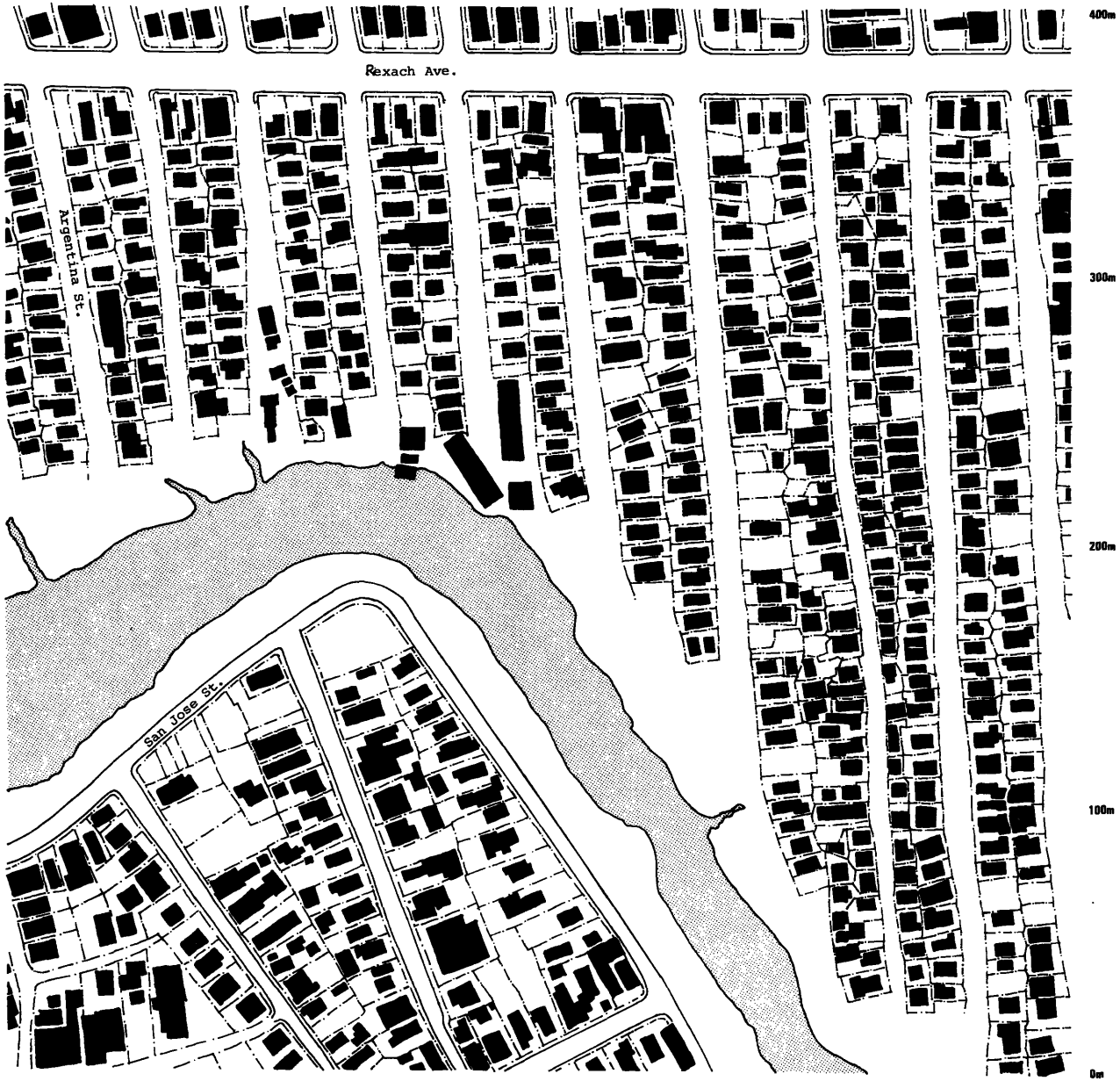
Plan:	*(accurate) Aerial Photo, DTOP, 1977.*
Land Use Pattern:	*(approximate) Zoning Maps, Planning Board, 1975 and Field Survey by author, 1977 and 1978.*
Circulation Pattern:	*(approximate) Volume Studies, 1977 and Field Survey by author, 1977.*
Segment Plan:	*(accurate) Aerial Photo, DTOP, 1977, Tax Maps, Department of the Treasury, 1975 and lot subdivision maps, CRUV, 1973.*
Block Plan:	*(accurate) IBID.*
Typical Dwelling:	*(approximate) As built survey by author, 1977.*
Physical Data:	*(accurate) Census, U.S. Dept. of Commerce, 1970*
Socio-Economic Data:	*(accurate) IBID.*
Photographs:	*by author.*



LOCALITY PLAN


WEST SANTURCE
EAST SANTURCE
BUSINESS DISTRICT
HATO REY
SS
S
Ch
R
LOCALITY LAND USE PATTERN
0 100 500m
1:10000
N
RESIDENTIAL
COMMERCIAL
INDUSTRIAL
INSTITUTIONAL
Pk Parking
P Police
F Fire Department
S School
Ch Church
R Recreation
L Library
U University
H Health
PO Post Office
SS Social Services
M Market
C Cemetery
Bus

LOCALITY CIRCULATION PATTERN

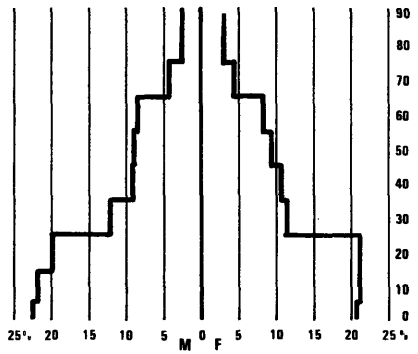


LOCALITY SEGMENT PLAN

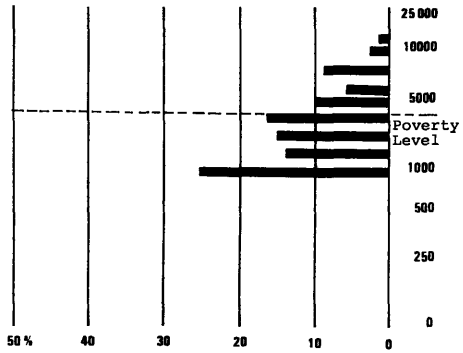
0 50 100 150m

1:2500

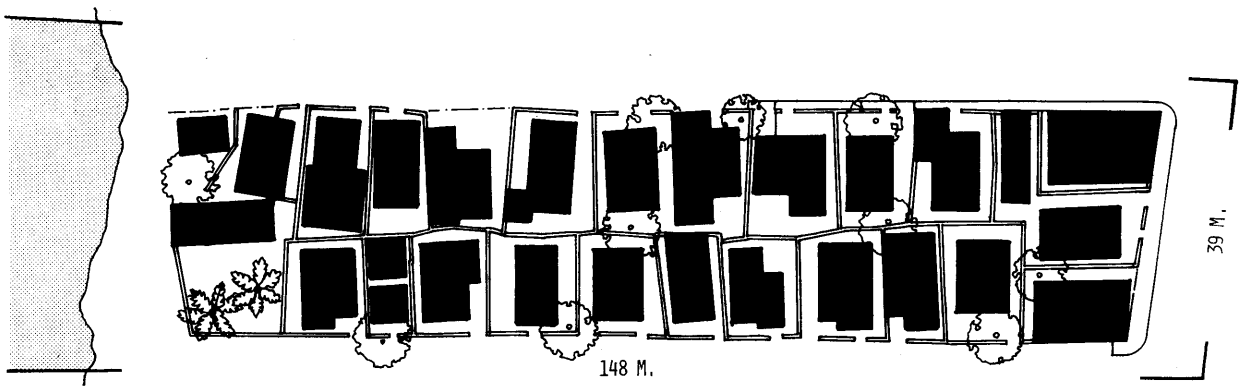
N



LOCALITY POPULATION DISTRIBUTION
horizontal: percentages vertical: ages
males: M females: F
Source:U.S. Census 1970



LOCALITY ANNUAL INCOME DISTRIBUTION
horizontal: percentages vertical: dollars
Source:U.S. Census 1970



LOCALITY BLOCK LAND UTILIZATION DATA

DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	25	.51	48.2
DWELLING UNITS	42	.51	81.0
PEOPLE	140	.51	270.2

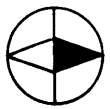
AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	.15	30%
SEMI-PUBLIC (open spaces, schools, community centers)	-	-
PRIVATE (dwellings, shops, factories, lots)	.36	70%
SEMI-PRIVATE (cluster courts)	-	-
TOTAL	.51	100%

NETWORK EFFICIENCY

$$\frac{\text{Network length (streets, walkways)}}{\text{Areas served (total area)}} = 589\text{M/Ha}$$

LOTS

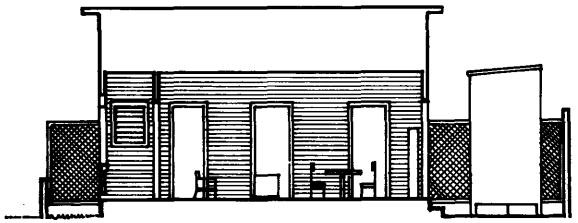
Average area, dimensions = 142.5 M^2



LOCALITY BLOCK PLAN

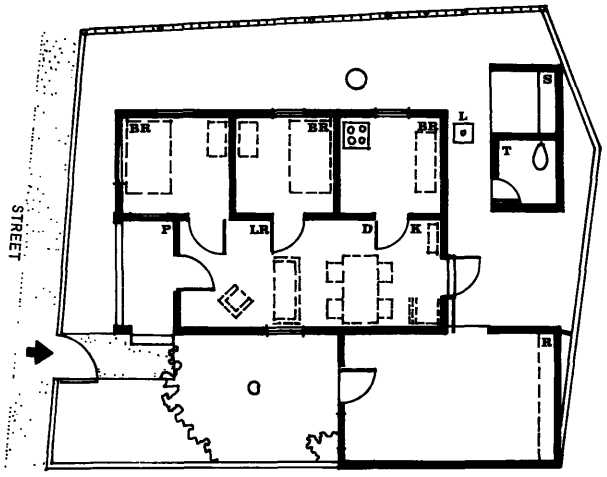
0 10 50m

1:1000



SECTION

ELEVATION



PLAN

TYPICAL DWELLING

0 1 5 10m

1:200

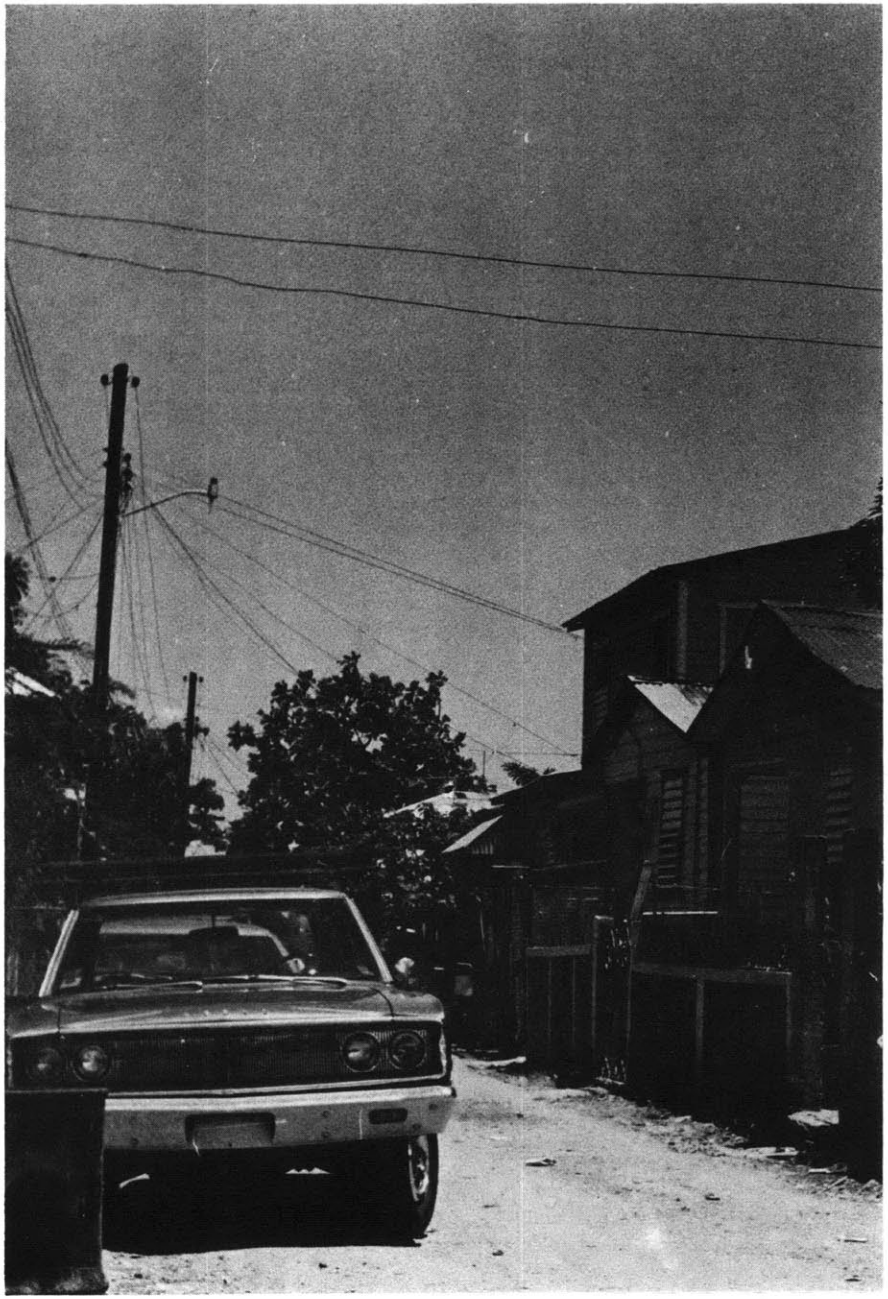
LR Living Room
D Dining
BR Bedroom
K Kitchen
T Toilet/Bathroom
L Laundry
C Closet
S Storage
R Room (multi-use)

PHYSICAL DATA
(related to dwelling and land)

DWELLING UNIT	
type:	INDIVIDUAL HOUSES
occupied:	93.0%
ownership:	59.8%
rental:	40.2%
persons per living unit	
1:	15.2%
2:	17.5%
3,4:	32.8%
5 or more:	34.2%
median:	3.4
LAND/ LOT	
utilization:	PRIVATE
tenure:	LEGAL/ILLEGAL: RENT/OWN
DWELLING	
location:	CITY CENTER
type:	DETACHED HOUSE
units in structure:	
1:	79.6%
2:	6.3%
3,4:	6.9%
5 or more:	3.8%
utilization:	SINGLE FAMILY
physical state:	BAD TO GOOD
DWELLING DEVELOPEMENT	
mode:	PROGRESSIVE
developer:	USER
builder:	USER/ARTISAN
construction types:	WOOD AND/OR CONCRETE
year of construction	
1960-1970:	16.7%
1950-1960:	28.7%
1940-1950:	41.3%
before 1940:	29.8%
DWELLING FACILITIES	
service connections	
water:	99.0%
sewer:	72.7%
electricity:	96.0%
individual services	
cooking facilities:	93.4%
plumbing:	12.0%
DWELLING UNIT PAYMENT	
cost of unit:	$5,100
financing:	-
payment per month:	$39 RENT
% of income	
income less than $3000:	30.7%
$3000-$6000:	16.9%
$6000-$10000:	
$10000 or more:	11

SOCIO-ECONOMIC DATA
(related to user)

GENERAL: SOCIAL	
user's ethnic origin	
native:	89.4%
native (foreign parents):	3.8%
foreign (born):	6.8%
education level	
none:	8.8%
elementary:	53.8%
high school:	30.0%
college:	7.3%
median:	7.7
FAMILY DATA	
number of families:	7,017
with children under 18:	48.6%
average family size:	4
GENERAL: ECONOMIC	
employment source	
goverment:	21.9%
private:	7.1%
private(self-employed):	71.0%
employment type	
construction:	10.7%
manufacturing:	10.9%
transportation:	4.8%
community services:	3.5%
trade:	20.5%
finance:	2.2%
business:	3.7%
personal services:	11.5%
health:	4.5%
education:	3.4%
professional services:	3.7%
public administration:	8.5%
other:	2.0%
TRAVEL TO WORK	
mode	
car (own):	28.0%
car (others):	5.4%
bus:	43.9%
"publico":	3.4%
walking:	12.9%
work at home/ other:	6.4%
MIGRATION PATTERNS	
year moved	
1960-1970:	56.6%
1950-1960:	18.7%
before 1950:	24.4%



CONCLUSION

CONCLUSION: The communities of Buena Vista as those of most Caño Martin Pena squatter settlements have long been ignored or dismissed as a true part of the Metropolitan Area due to its origins and its composition.

Of the five case studies Buena Vista is the only area in whose original development there was no government intervention. The area was progressively developed and it is out of this mode of development that it achieved its positive and negative characteristics.

The most positive aspect of Buena Vista as well as other squatter settlements was that it was built at all. Constructed on theoretically unsuitable land, ignored by the government which refused to recognize them and grant them services, the original settlers proved that they could, through the accretive process, create a true community, physically poorer than most public housing but in the character of a more desirable and appropriate lifestyle.

The second positive aspect is that of layout. Though haphazard, the layout of Buena Vista shows two things: the recognition of the surrounding area and its impact on the design of the communities through continuation or in response to it, and the design of the area according to it.

The third positive aspect is found in the land subdivision. Though haphazard and based on the desire for individual houses, the lots in Buena Vista are small, recognizing the acceptability of denser subdivision in low income settlements. There is also a larger number of alternate grouping patterns such as court schemes.

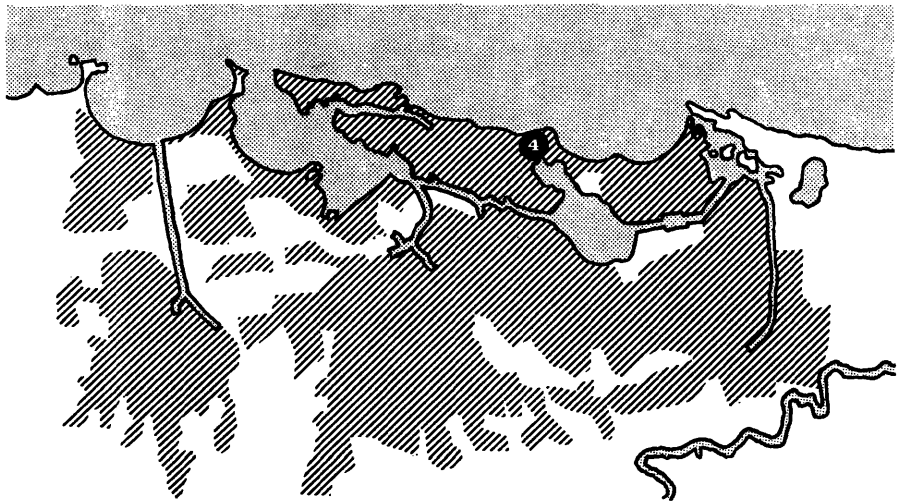
But the most important aspect of Buena Vista, and of many squatter settlements which have remained and have been consolidated, is its political strength. When, after World War II, the decision was made to eradicate the squatter settlements and move them to other housing, nobody realized the magnitude and difficulty of such an operation and the intransigence of the people to move. The result of this was that some of the squatter communities stayed in place, consolidated, and with their consolidation demanded services. This resulted in partial infrastructure and in the creation of a housing cooperative to acquire and upgrade the area.

The problems of Buena Vista are many, and are closely tied to the positive aspects.

The most serious problems are those of location and layout. The first is detrimental to the settlements because they lie on the periphery of established areas which have turned their backs on the settlements. The second is that the haphazard development of the area has created such a large variety of blocks and dead-end situations that it is difficult to provide infrastructure and it also produces poor circulation.

The other problem is that of land use. Due to the type of settlement, its position and its layout, land use other than for residential is poor. There is little commercial or institutional facilities in the settlements forcing the inhabitants to go outside for the various services.

LUIS LLORENS TORRES
PUBLIC HOUSING PROJECT



4 LUIS LLORENS TORRES

LOCATION: The Luis Llorens Torres housing project is located on a plain between the hill which forms East Santurce, and the Atlantic Ocean. It is bordered on the north by Loiza Street and the Atlantic Ocean, on the south by Baldorioty de Castro Avenue and the bulk of East Santurce, on the east by the Atlantic View tract housing development, and on the west, by the Loiza "barrio".

HISTORY: The project is one of several housing developments started in the 1940's and 1950's to provide housing for people being evicted from squatter settlements. It was developed under a Federal/State program of Public Housing which involved publicly subsidized rental apartments for the poor and very poor. It is the largest public housing project built in Puerto Rico under any program. The project, probably following U.S. public housing practices of the 50's, grouped a large number of displaced poor in one area and housed them in multi-apartment walk-up units set in a pedestrian, semi-public open area. The loss of personal control over an area was expected to be balanced by the large semi-public open spaces and the on-site institutional, recreational, and commercial services but, the idea did not work. The automobile has taken over and many of the semi-public areas have been converted into parking lots. The commercial areas have been insufficient (a fact first noted by the developers of a shopping center on the west boundary) and has forced the creation of small commercial kiosks. The remaining green spaces were either taken by adjoining apartments, ignored, or used as dumping areas. The social/institutional facilities have also been misused prompting the creation of a police station for community security in the 1970's.

SOCIO-ECONOMIC: Since its inception the socio-economic character of the project has remained basically the same due to the obligations of Public Housing. This has resulted in problems which are reflected in the community. The project brought together a large group of poor families to a way of life transitory in theory but permanent in practice. The realization of the permanence of this situation led to the institutionalization of a continuous state of poverty to maintain this status.

Of all the areas in Metropolitan San Juan, the rental public housing projects of the Llorens Torres variety have the lowest socio-economic indexes: 84% of its families are below the poverty level. Only 33% of all adults have finished grade school. It has the greatest number of children under 18 and the largest families. The per capita income is the lowest of the city. One of the results of this is a subculture of poverty which perpetuates itself.

LAYOUT: The layout is based on the "garden" concept of planning. Vehicular interior roads were originally considered access roads mainly for emergency and public vehicles. One major street was planned in the project with the others being loop access or through streets. A large planned layout of pedestrian walkways has been overlaid through the years by a popular layout created by use. In the last decades a large number of parking areas have been created between buildings.

The buildings, as well as the circulation, are laid on a northwest-southeast axis, contrary to the north-south axis of the area surrounding it.

DWELLING: The buildings are dumbell or pinwheel design, 3 story walk-ups, organized around stairwells. They are constructed of poured in place concrete and concrete blocks. The units themselves follow Federal and State minimum standards. All units have a balcony, a living-dining area, a kitchen with an exterior service balcony, a bathroom, and one to four bedrooms with closets. Windows are aluminum jalousies both for protection as well as climate control.

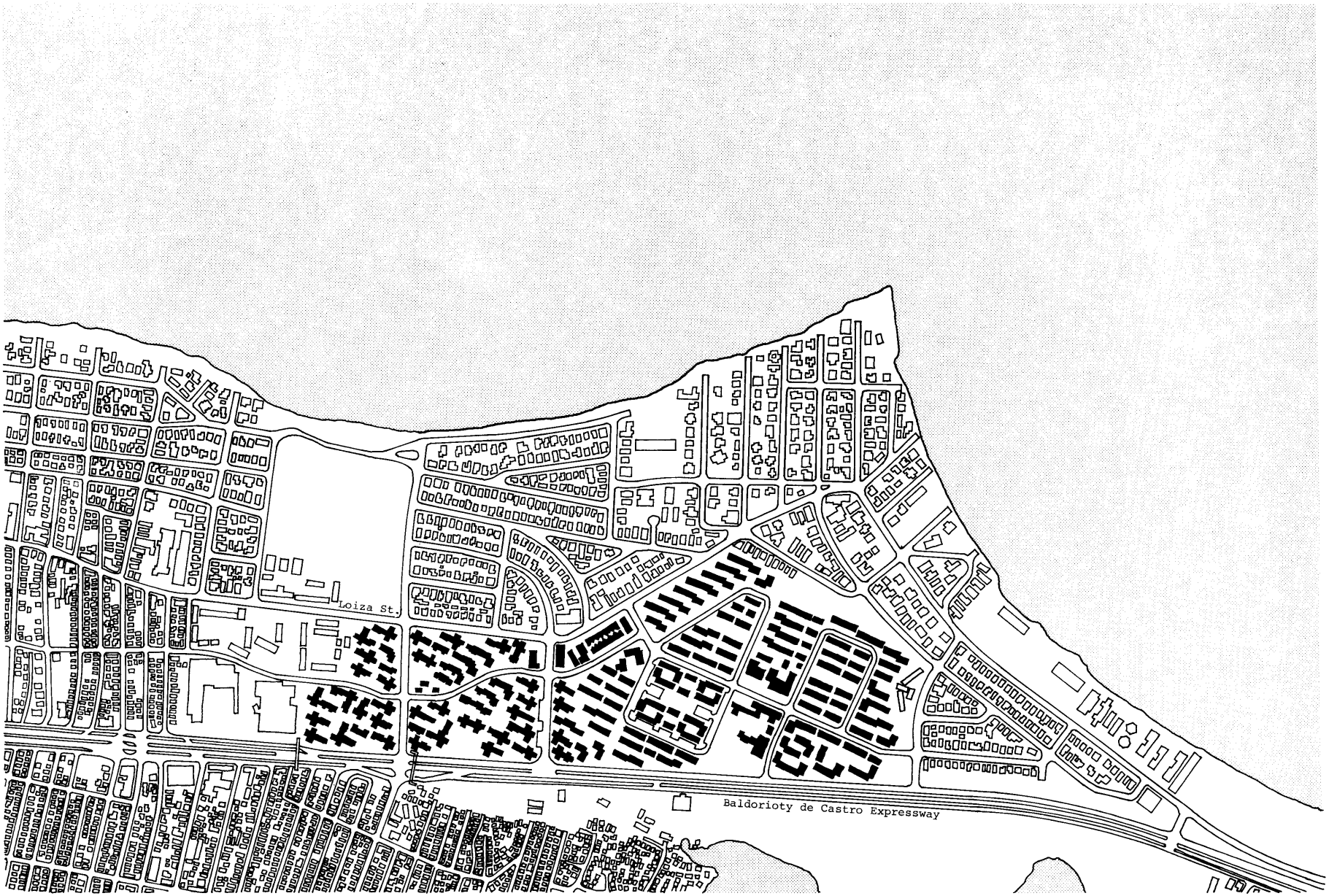
LAND USE: All land use in the project is the result of the original plan or accommodations to it. The original plan included a commercial mall, two schools, a church, recreational park facilities and buildings to house the institutional services and the management. But the commercial was insufficient and inefficient for the traditional small scale shops and small kiosks were built inside the project. Originally there was little parking but in the 70's parking lots were created.

The project has encouraged land speculation on its periphery. There is a shopping center on the west and a series of commercial facilities on the north.

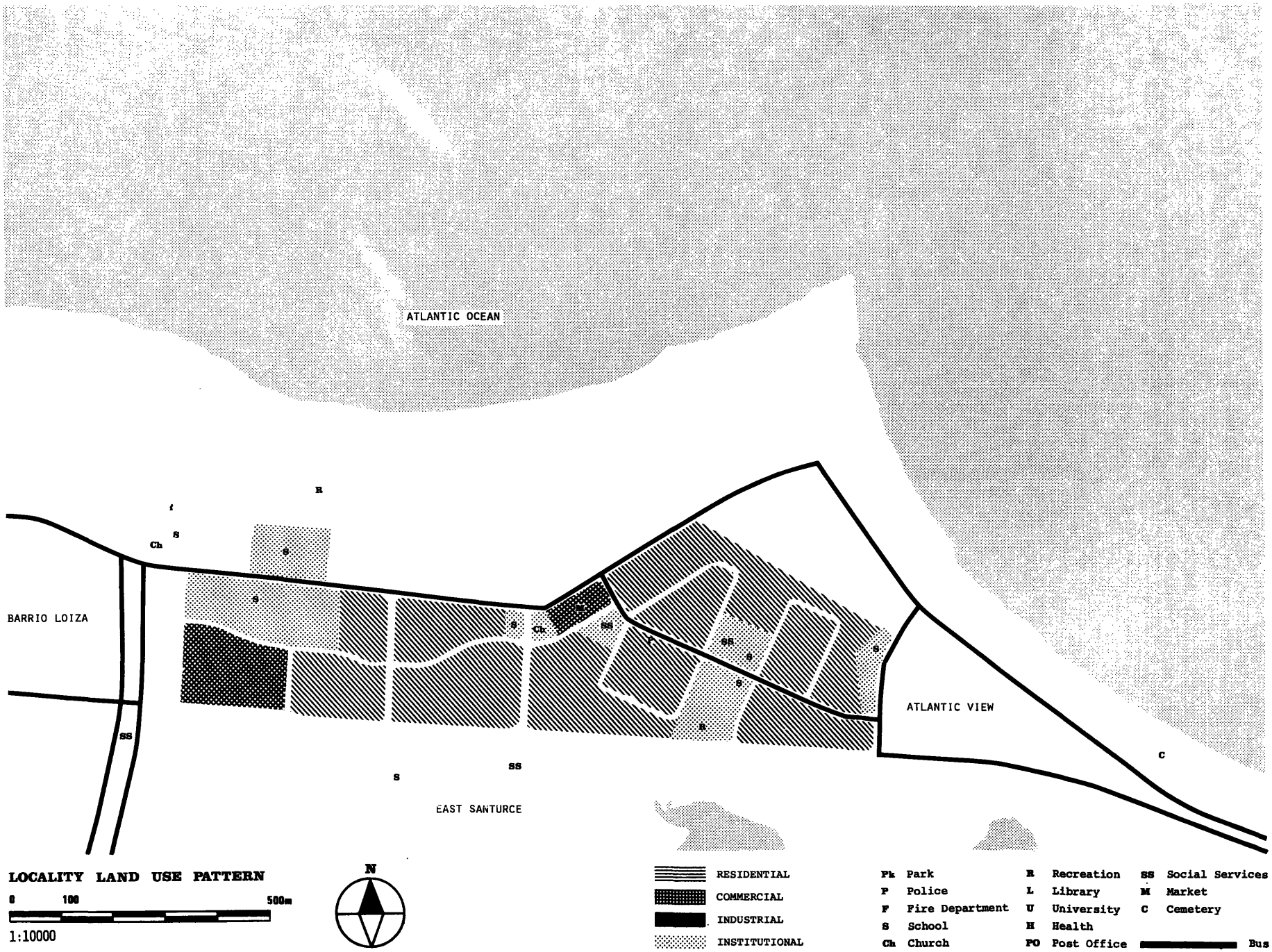
CIRCULATION: The project lies between a major highway, Baldorioty de Castro Avenue, and a major street, Loiza Street. Baldorioty de Castro is the main connector to the east and west of Metropolitan San Juan. Loiza is the main access to the Loiza Barrios' commercial strip. There are eight street accesses to the project. There is only one major vehicular street in the project which runs east to west and is also used by buses. This street is the main access to all secondary roads and to the parking lots. Most interior circulation is pedestrian, restricted mainly by the size of the project and social variants such as crime.

LUIS LLORENS TORRES CASE STUDY SOURCES:

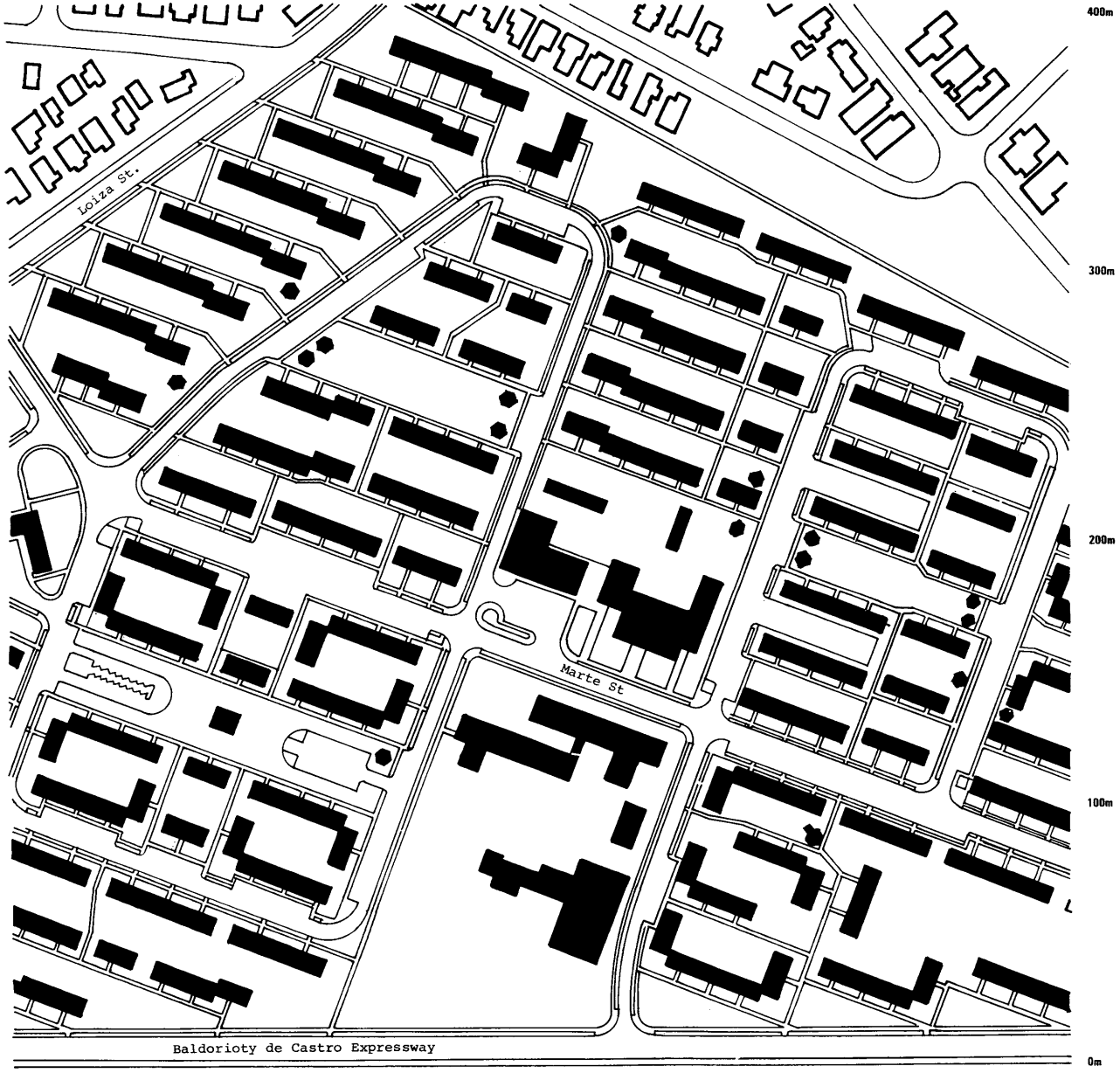
Plan:	*(accurate) Aerial Photo,DTOP, 1977.*
Land Use Pattern:	*(accurate) Construction Plans, CRUV, Zonning Maps,Planning Board, 1975 and field survey by author, 1977 and 1978.*
Circulation Pattern:	*(approximate) Volume Studies, DTOP, 1977 and field survey by author, 1977 and 1978.*
Segment Plan:	*(accurate) Aerial photo,DTOP, 1977, Construction Maps, CRUV, Tax Maps, Dept. of the Treasury, 1975.*
Block Plan:	*(accurate) IBID.*
Typical Dwelling:	*(accurate) Construction Plans, CRUV.*
Physical Data:	*(accurate) Census, U.S. Dept. of Commerce, 1970.*
Socio-Economic Data:	*(accurate) IBID.*
Photographs:	*by author.*



LOCALITY PLAN


ATLANTIC OCEAN
BARRIO LOIZA
EAST SANTURCE
ATLANTIC VIEW
LOCALITY LAND USE PATTERN
0 100 500m
1:10000
N
RESIDENTIAL
COMMERCIAL
INDUSTRIAL
INSTITUTIONAL
Pk Park
P Police
F Fire Department
S School
Ch Church
R Recreation
L Library
U University
H Health
PO Post Office
SS Social Services
M Market
C Cemetery
Bus


BETANCES ST.
LOIZA ST.
JUPITER ST.
BALDORIOTY DE CASTRO EXPRESSWAY
N
LOCALITY CIRCULATION PATTERN
0
100
500m
1:10000
VEHICULAR
PEDESTRIAN

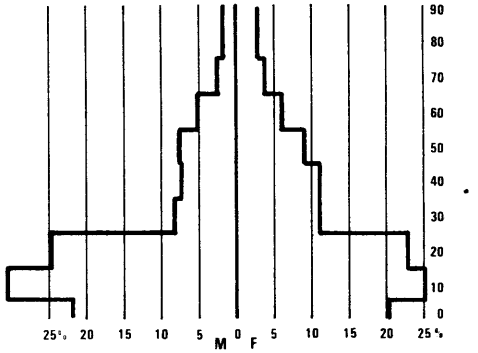


LOCALITY SEGMENT PLAN

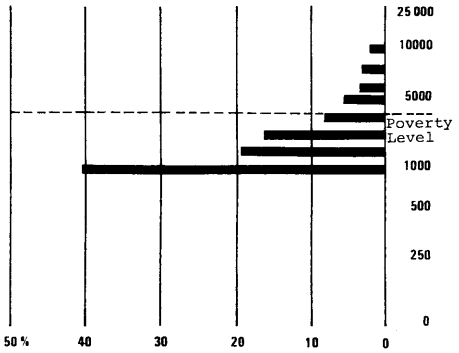
0 50 100 150m

1:2500

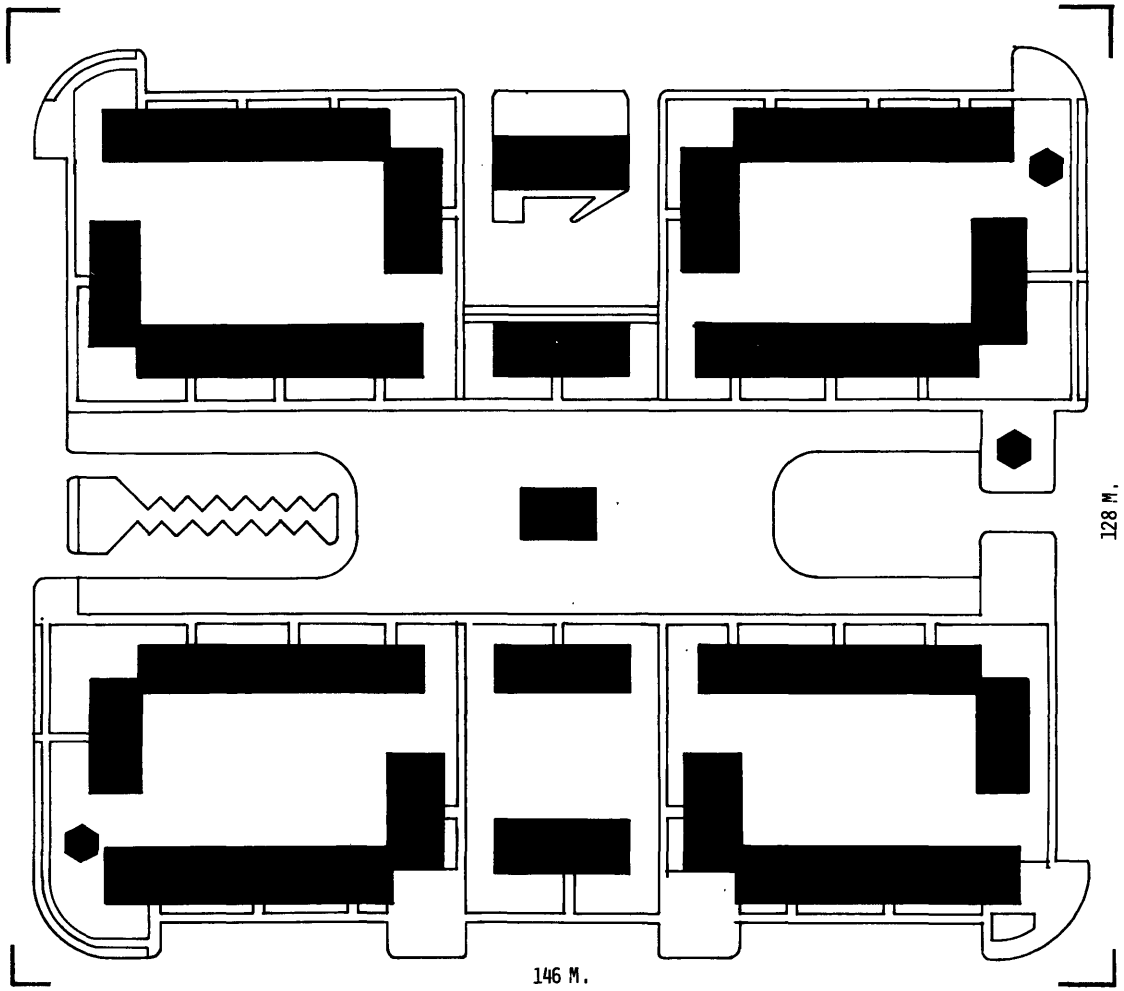
N



LOCALITY POPULATION DISTRIBUTION
horizontal: percentages vertical: ages
males: M females: F
Source: U.S. Census 1970



LOCALITY ANNUAL INCOME DISTRIBUTION
horizontal: percentages vertical: dollars
Source: U.S Census 1970



LOCALITY BLOCK LAND UTILIZATION DATA

DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	-	-	-
DWELLING UNITS	221	2.37	93.2
PEOPLE	1098	2.37	463.2

AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	1.81	76%
SEMI-PUBLIC (open spaces, schools, community centers)	-	-
PRIVATE (dwellings, shops, factories, lots)	.56	24%
SEMI-PRIVATE (cluster courts)	-	-
TOTAL	2.37	100%

NETWORK EFFICIENCY

$\frac{\text{Network length (streets, walkways)}}{\text{Areas served (total area)}}$ = 262M/Ha

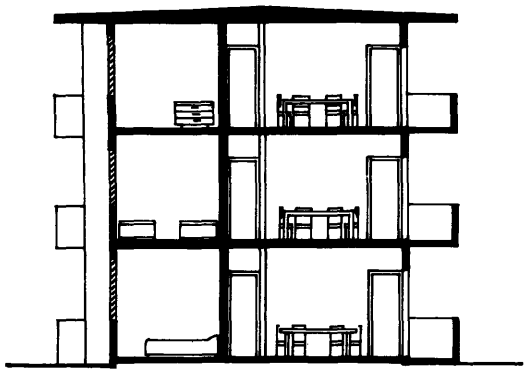
LOTS

Average area, dimensions = No Lots

LOCALITY BLOCK PLAN

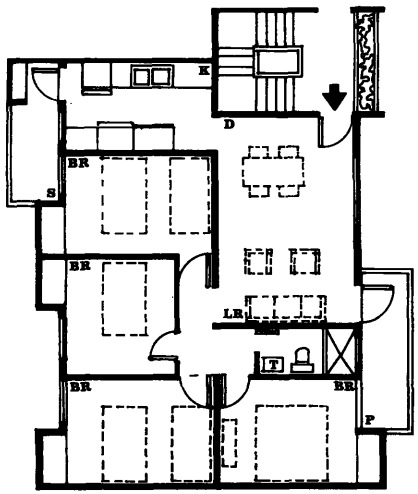
0 10 50m

1:1000



SECTION

ELEVATION



PLAN

KEY

LR	Living Room
D	Dining
BR	Bedroom
K	Kitchen
T	Toilet/Bathroom
L	Laundry
C	Closet
S	Storage
R	Room (multi-use)

TYPICAL DWELLING

0 1 5 10m

1:200

PHYSICAL DATA
(related to dwelling and land)

DWELLING UNIT	
type:	APARTMENTS
occupied:	98.7%
ownership:	-
rental:	100%
persons per living unit	
1:	8.3%
2:	14.4%
3,4:	29.0%
5 or more:	48.1%
median:	
LAND/ LOT	
utilization:	PUBLIC
tenure:	LEGAL RENTAL(PUBLIC SUBSIDY)
DWELLING	
location:	CITY CENTER
type:	WALK-UP/GROUP
units in structure:	
1:	-
2:	-
3,4:	-
5 or more:	100%
utilization:	SINGLE FAMILY
physical state:	FAIR TO GOOD
DWELLING DEVELOPEMENT	
mode:	INSTANT
developer:	PUBLIC(GOVERMENT)
builder:	LARGE CONTRACTOR
construction types:	CAST IN PLACE CONCRETE
year of construction	
1960-1970:	.5%
1950-1960:	51.0%
1940-1950:	35.2%
before 1940:	13.2%
DWELLING FACILITIES	
service connections	
water:	100%
sewer:	100%
electricity:	100%
individual services	
cooking facilities:	100%
plumbing:	100%
DWELLING UNIT PAYMENT	
cost of unit:	-
financing:	-
payment per month:	$13 RENT
% of income	
income less than $3000:	24.7%
$3000-$6000:	10.0%
$6000-$10000:	10.0%
$10000 or more:	-

SOCIO-ECONOMIC DATA
(related to user)

GENERAL: SOCIAL	
user's ethnic origin	
native:	99.5%
native (foreign parents):	.4%
foreign (born):	.1%
education level	
none:	19.1%
elementary:	62.0%
high school:	18.0%
college:	7.0%
median:	5.1
FAMILY DATA	
number of families:	2,353
with children under 18:	64.7%
average family size:	5
GENERAL: ECONOMIC	
employment source	
goverment:	17.6%
private:	5.8%
private(self-employed):	77.6%
employment type	
construction:	12.5%
manufacturing:	5.7%
transportation:	6.4%
community services:	2.9%
trade:	26.3%
finance:	2.6%
business:	7.3%
personal services:	18.9%
health:	4.8%
education:	2.2%
professional services:	2.6%
public administration:	6.1%
other:	1.0%
TRAVEL TO WORK	
mode	
car (own):	15.2%
car (others):	3.5%
bus:	58.4%
"publico":	3.7%
walking:	17.8%
work at home/ other:	1.4%
MIGRATION PATTERNS	
year moved	
1960-1970:	59.7%
1950-1960:	36.0%
before 1950:	4.2%

CONCLUSION

CONCLUSION: The Luis Llorens Torres Housing Project is the largest and one of the oldest public housing projects built in Puerto Rico. It is the best example of the problems large-scale public housing projects have had in Puerto Rico.

Though the entire project was not built at the same time it is considered instant because it was executed according to a pre-conceived plan and is, in physical character, homogenous and unchangeable. The few changes which have occurred, kiosks and parking lots, are more the result of imposed lifestyles than of community participation.

At its most simplistic level, public housing, and thus Luis Llorens Torres, achieved its purpose, that of giving a standard living unit to people who could not afford to buy one. It provided them also with accessible schools, an accessible commercial area, as well as certain social and recreational services.

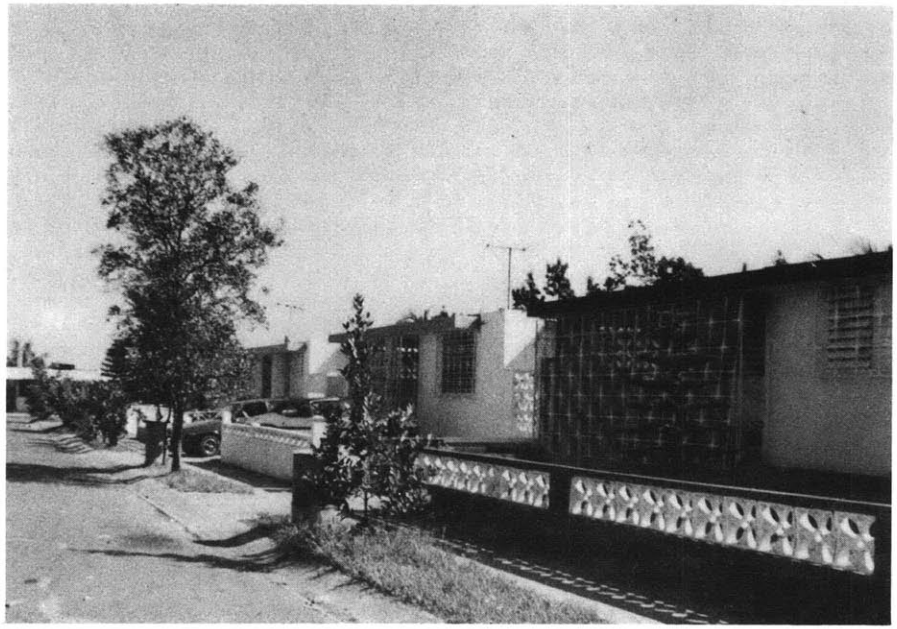
But the project, from the very start, was a failure. There were two main reasons: the physical setting and the socio-economic character created by the project.

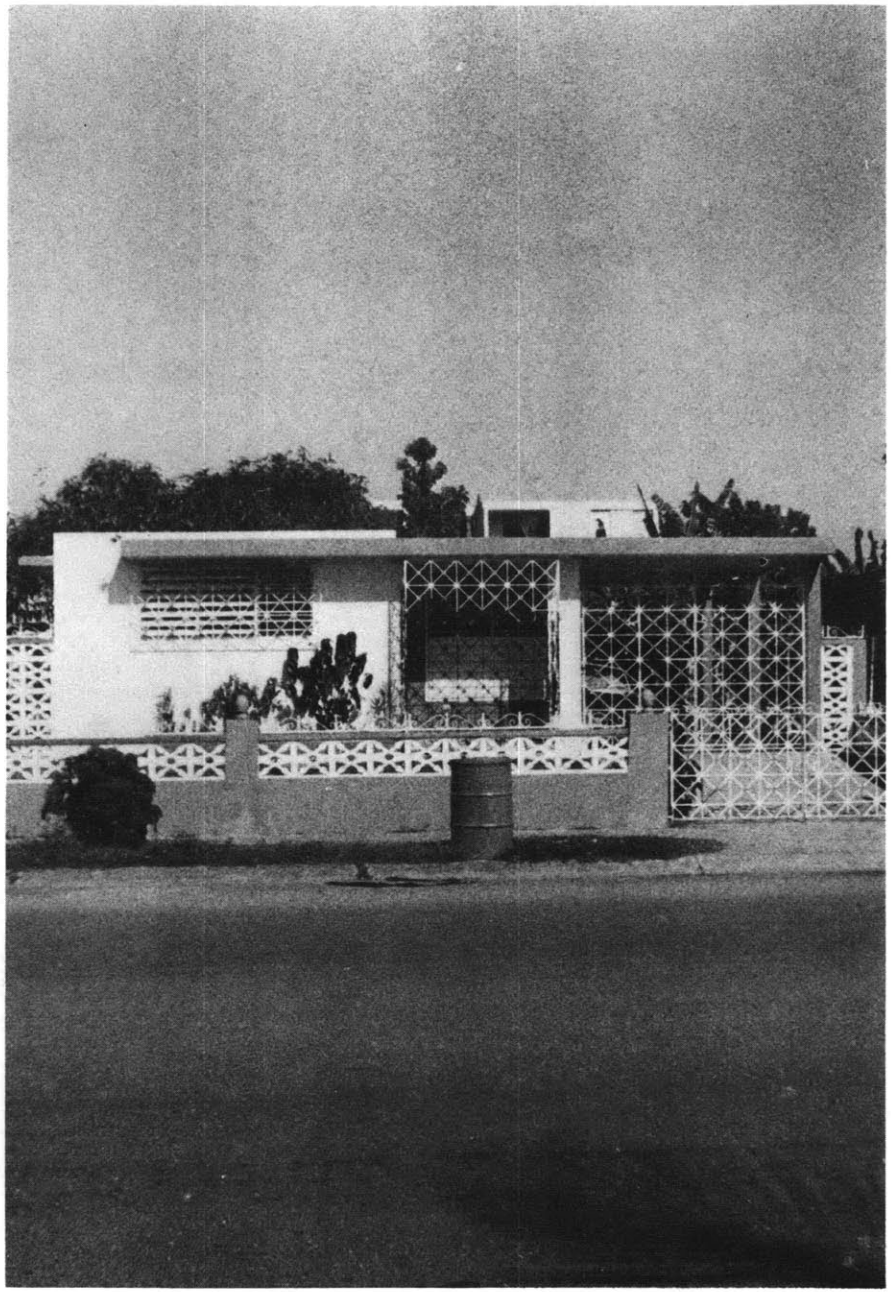
The first mistake made in the physical layout was that of size. Because of economics and because the idea at the time was directed toward massive relocations, the project, when completed, was the largest in Puerto Rico. The results of the size of the project have been various. Though in the middle of a residential area, it has become a ghetto separated from the surrounding community by the socio-economic character of the project as well as deep mistrust and fear between the project's inhabitants and the surrounding communities. Due also to size, management of the area has been impossible, particularly with security. This, coupled with the large distances between the buildings, the rise of crime, and other social ills, has created a population disfranchised from the exterior and weary of interior community development.

The second mistake was layout. Luis Llorens Torres is an example of the design concept of the fifties where the buildings were placed on an imaginary gridiron, in a garden setting unencumbered by roads and connected through pedestrian paths. This did not work for two reasons. First, there was the problem of alienation and lack of identification with areas which were public for the whole project and which could not be changed due to the law and the design. The second was the desire of the users to have automobiles and a place to park them in a protected setting.

The third mistake was in the type of building. To people accustomed to single story, detached housing in various forms, the three story walk-ups were unacceptable because of their uniformity and unchangeability, their impersonality, the semi-public stairs, and the great number of families housed in one structure.

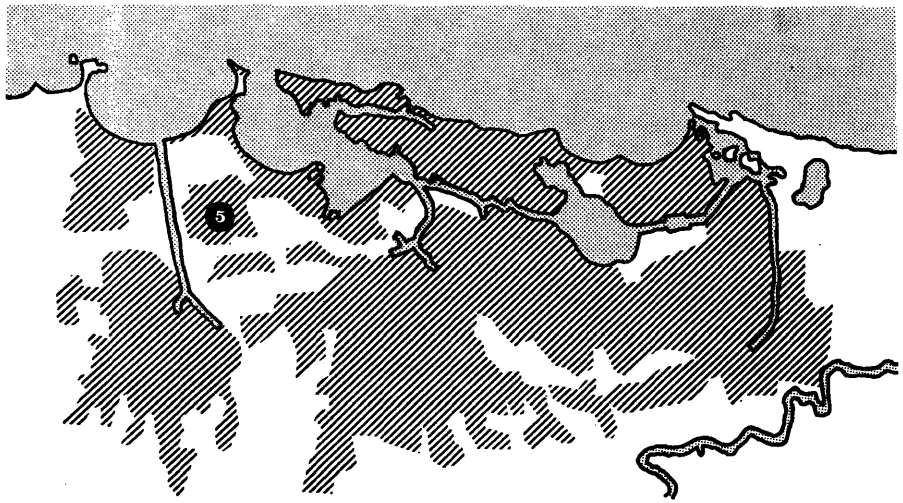
In socio-economic terms the mistake was grouping a large number of poor families at the same time in one place, and at the same time expect them to move out of the "temporary" public housing. What resulted instead was the creation of a subculture of poverty which perpetuates itself because it does not want to go back to squatter settlements and can not or will not achieve the economic position necessary to leave the project.





LAS VEGAS

TRACT HOUSING DEVELOPMENT



5 LAS VEGAS

LOCATION: Las Vegas, a tract housing development (in Puerto Rico, an "urbanizacion"), is bordered on the north by the Catano and Las Palmas public housing projects and the Cucharillas squatter settlements; on the south by the De Diego Toll Express Highway; on the east by undeveloped land, Insular Road #167 and various industrial facilities; and on the west, by an industrial zone, Insular Road #869, and the Bayamon River canal.

HISTORY: Las Vegas is an example of speculative housing developments started after the 1950's to capitalize on the demands of a growing lower middle class, cheap suburban land, low costs of construction, easy developer access to interim financing and greater user access to mortgages, particularly those guaranteed by the Federal Government. It was constructed in sections by a private developer, who sold each completed section to clients who usually were financed through Federal Guaranteed Mortgages. The last section of the project was acquired by C.R.U.V., the housing authority, to be rented and eventually sold to poor or poor-middle class families who the agency (and the Federal Housing and Urban Development Agency) thought capable of paying a mortgage subsidized by the government.

SOCIO-ECONOMIC: In economic terms, the project, unlike most other developments which are low-middle to high-middle income, is low and middle income and reflects the involvement of the housing agency. The physical or social profile of the area is uncharacteristic of these lower economic groups. The poor who come here aspire to become middle class and, within their limited resources, lead the life of their more affluent neighbors. There is great number of young families in their 30's and 40's, and a great number of children under 18. There are few couples, singles, or elderly people living by themselves. The education level is high. More than half of the adults have finished high school. The greatest hinderance to community development has been the physical layout. The house has become a means of social expression. The moment they are bought, they are transformed by additions, new finishes, new facades, etc. There is great pride in ownership of a physical piece of property. Most social interaction between families occurs on the streets. Most labor sources, as well as most of the commercial, recreational, and institutional services are outside of the development. This, coupled with little or no public transportation, has created a culture based on the automobile. The automobile has become, second to the house, a symbol of security to the inhabitants of this development, as well as their primary means of transportation, not only to other areas but also locally.

LAYOUT: Las Vegas is built on relatively flat land. The layout is based on Federal minimum property standards as well as standards and zoning regulations from the Puerto Rico Planning Board. It consists of a series of long blocks pinwheeling around a large central public area and two major streets. The block width is usually determined by the required minimum dimensions of the back to back lots. The length is a result of topography, layout, and infrastructure. Both dimensions are increased by required planting strips and sidewalks. The lot size is partially determined by required setbacks from the house on all four sides, as required by federal and state standards.

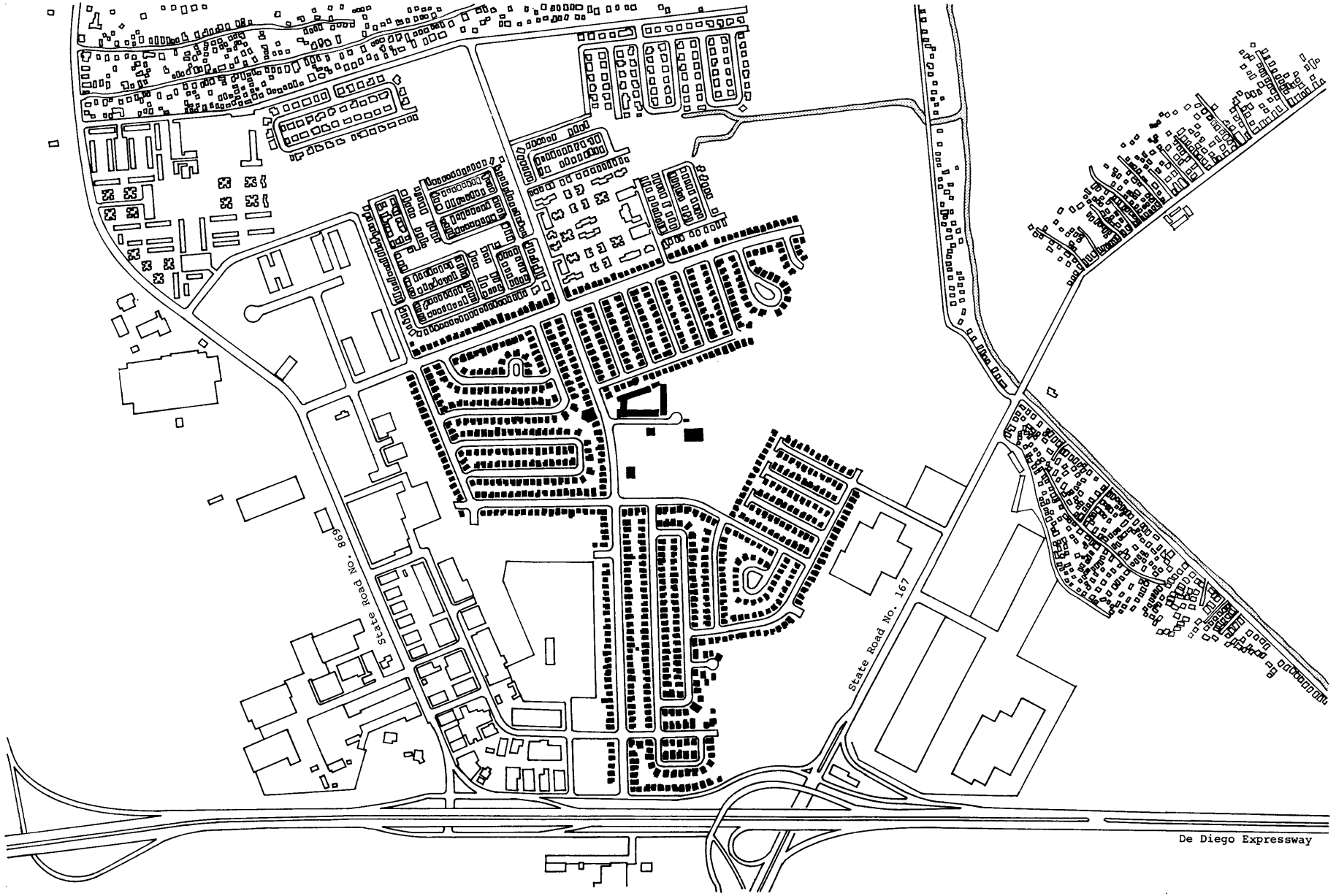
DWELLING: The design of the house is the result of these standards as well as economy in construction. They are constructed in concrete, using a bearing wall system of three parallel bays with a flat slab roof and floor. The house consists of a living/dining area, a kitchen, a bathroom, two to three bedrooms, and a covered carport. To this simple layout, the user attaches new finishes, new rooms, facades, etc., usually extralegally.

LAND USE: Due to zoning laws, planning ordinances, and building regulations, land use in Las Vegas is very restricted. The central area is the zoned space for institutional, commercial and recreational facilities. At present there only exists a school, a center for drug rehabilitation, a church and a gas station. The area around these facilities is zoned for low density residential. Nevertheless, there are some commercial and religious facilities in the residences primarily in the main streets. To the east and west of the development there are areas zoned for industrial purposes. To the north of the settlement the area is used for residential purposes, mainly public housing.

CIRCULATION: The development is accessible to the south via the De Diego Expressway, the main high speed connector between the west and the center of the city. To the east is Insular Road #169, a main connector between the cities of Bayamon and Catano. To the west is Insular Road #869, which connects the area to Insular Road #165 and the west of the Island of Puerto Rico. There is one main road in the interior of the project, Flor del Valle, running north to south, around which a few commercial facilities are located and which is also a main access to the public housing projects in the north. This street, along with two others that intersect it perpendicularly, serves as a collector of traffic of the secondary interior streets.

LAS VEGAS CASE STUDY SOURCES:

Plan:	*(accurate) Aerial Photo, DTOP, 1977.*
Land Use Pattern:	*(accurate) Construction Maps, 1968, Zoning Maps, Planning Board, 1975 and Field Survey by author, 1977.*
Circulation Pattern:	*(approximate) Volume Studies, DTOP, P.R., 1977 and Field Survey by author, 1977.*
Segment Plan:	*(accurate) Construction Plans, 1968, and Tax Maps, Department of the Treasury, 1975.*
Block Plan:	*(accurate) IBID.*
Typical Dwelling:	*(accurate) Construction Plans and Survey by author.*
Physical Data:	*(accurate) Census, U.S. Dept. of Commerce, 1970.*
Socio-Economic Data:	*(accurate) IBID.*
Photographs:	*by author and Alfonso Rodriguez*

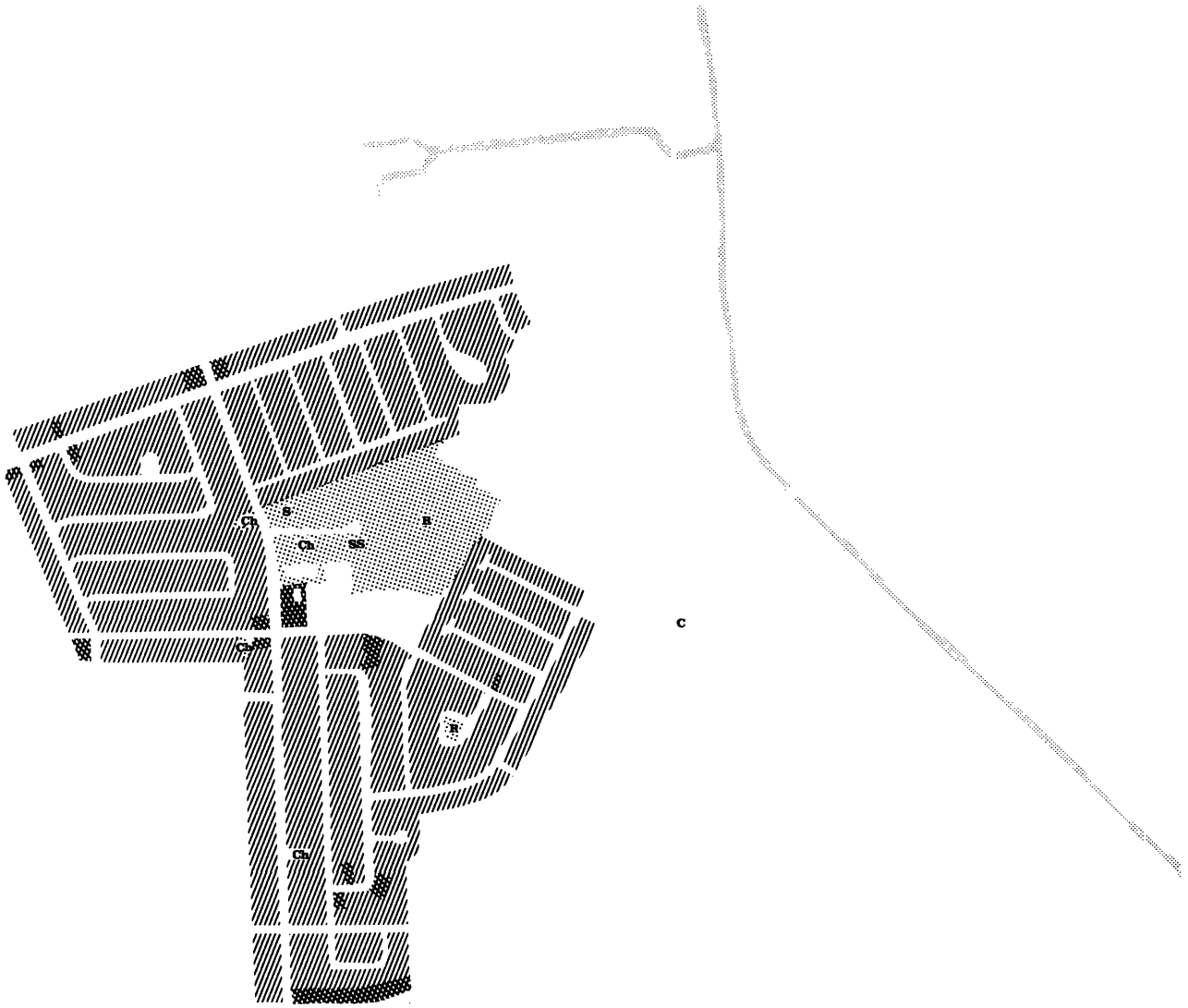


LOCALITY PLAN

N

0 100 500m

1:10000



LOCALITY LAND USE PATTERN

0 100 500m

1:10000

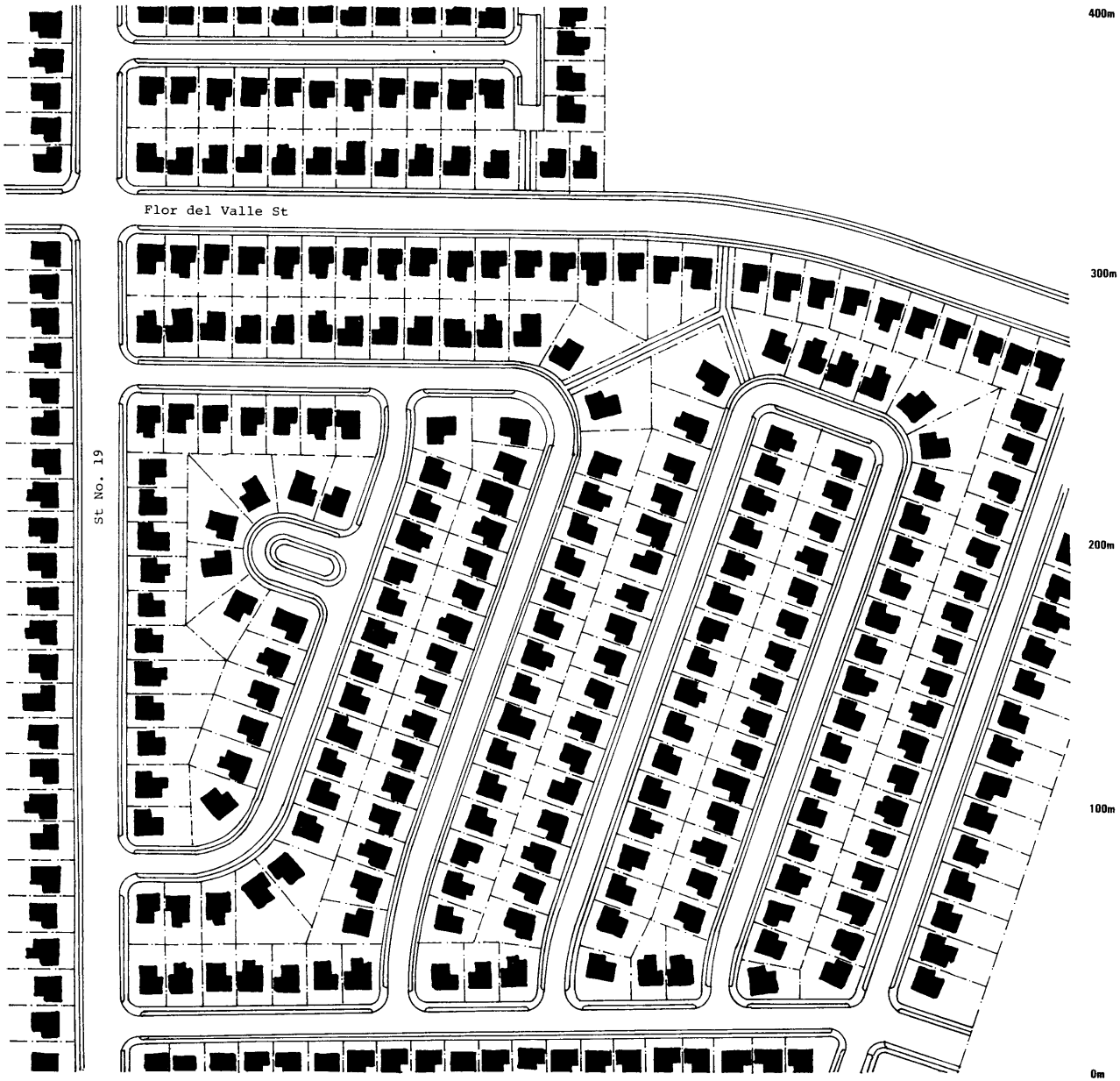
N

RESIDENTIAL
COMMERCIAL
INDUSTRIAL
INSTITUTIONAL

KEY

Pk	Parking	R	Recreation	SS	Social Services
P	Police	L	Library	M	Market
F	Fire Department	U	University	C	Cemetery
S	School	H	Health		
Ch	Church	PO	Post Office		Bus

LOCALITY CIRCULATION PATTERN

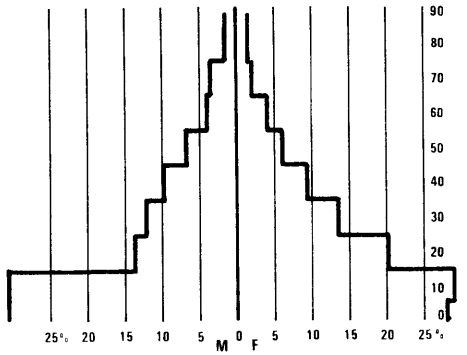


LOCALITY SEGMENT PLAN

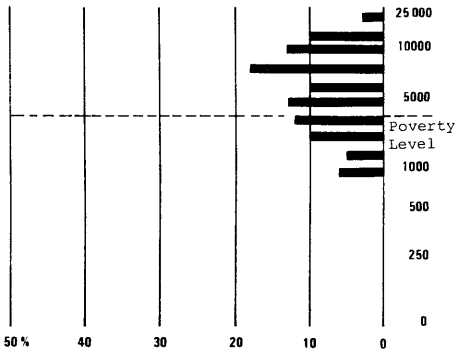
0 50 100 150m

1:2500

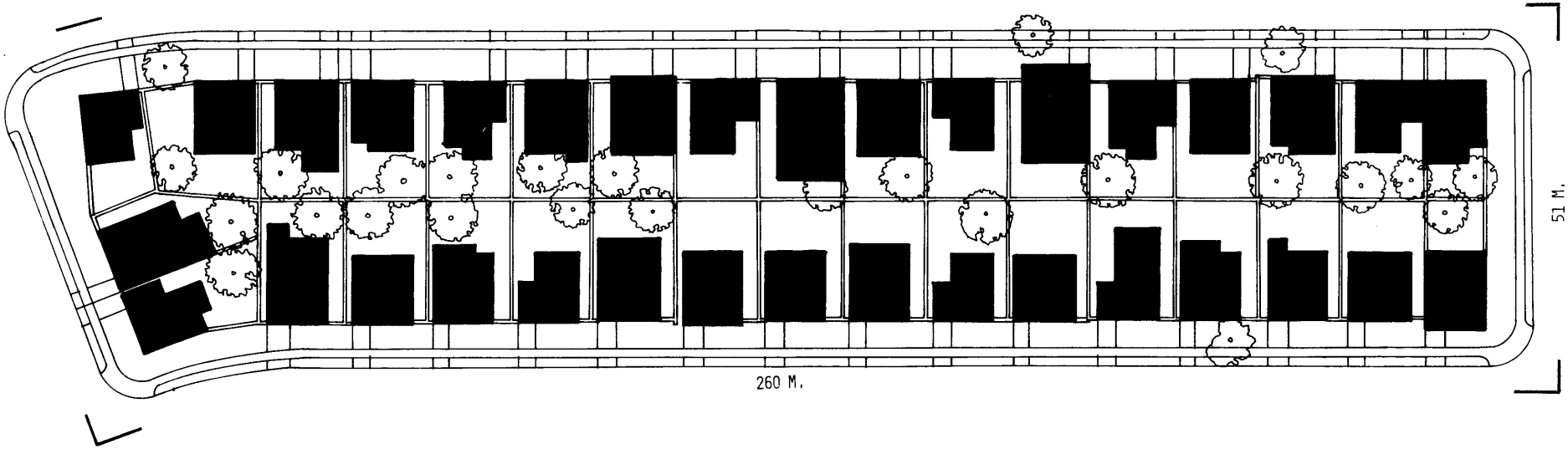
N



LOCALITY POPULATION DISTRIBUTION
horizontal: percentages vertical: ages
males: M females: F
Source: U.S. Census 1970



LOCALITY ANNUAL INCOME DISTRIBUTION
horizontal: percentages vertical: dollars
Source: U.S. Census 1970



LOCALITY BLOCK LAND UTILIZATION DATA

DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	34	1.39	24.4
DWELLING UNITS	34	1.39	24.4
PEOPLE	152	1.39	109.3

AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	.29	20%
SEMI-PUBLIC (open spaces, schools, community centers)	-	-
PRIVATE (dwellings, shops, factories, lots)	1.10	80%
SEMI-PRIVATE (cluster courts)	-	-
TOTAL	1.39	100%

NETWORK EFFICIENCY

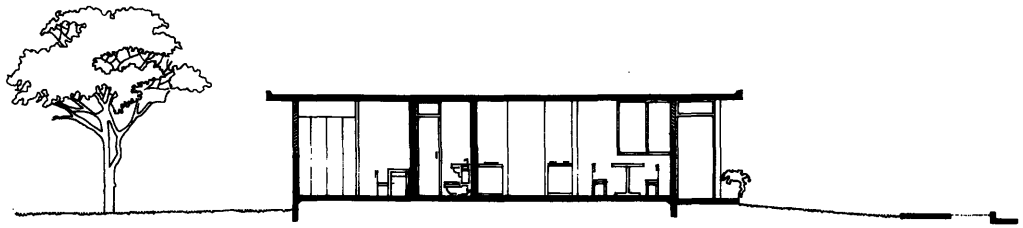
$\frac{\text{Network length (streets, walkways)}}{\text{Areas served (total area)}} = 428 M/H$

LOTS

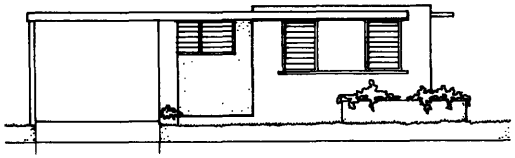
Average area, dimensions = 299 M^2

LOCALITY BLOCK PLAN

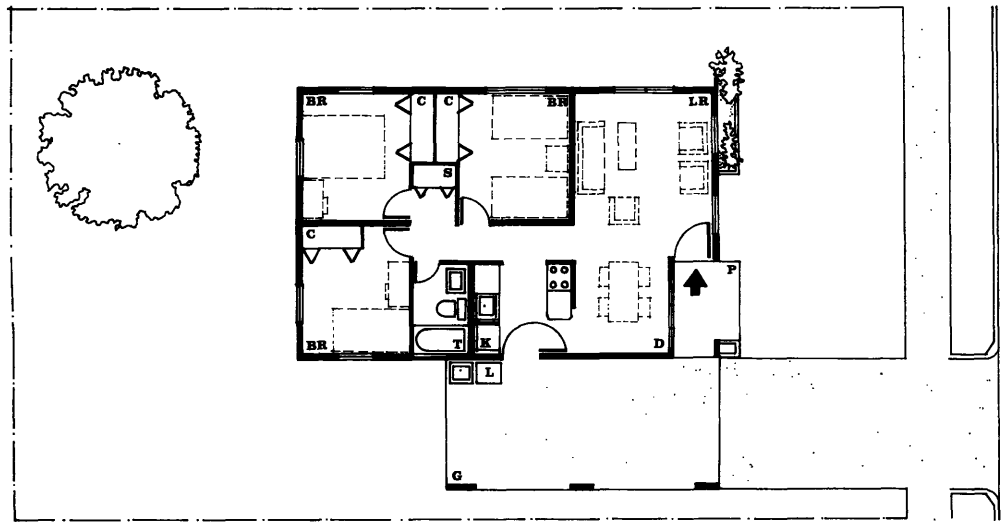
1:1000



SECTION



ELEVATION



PLAN

TYPICAL DWELLING

0 1 5 10m

1:200

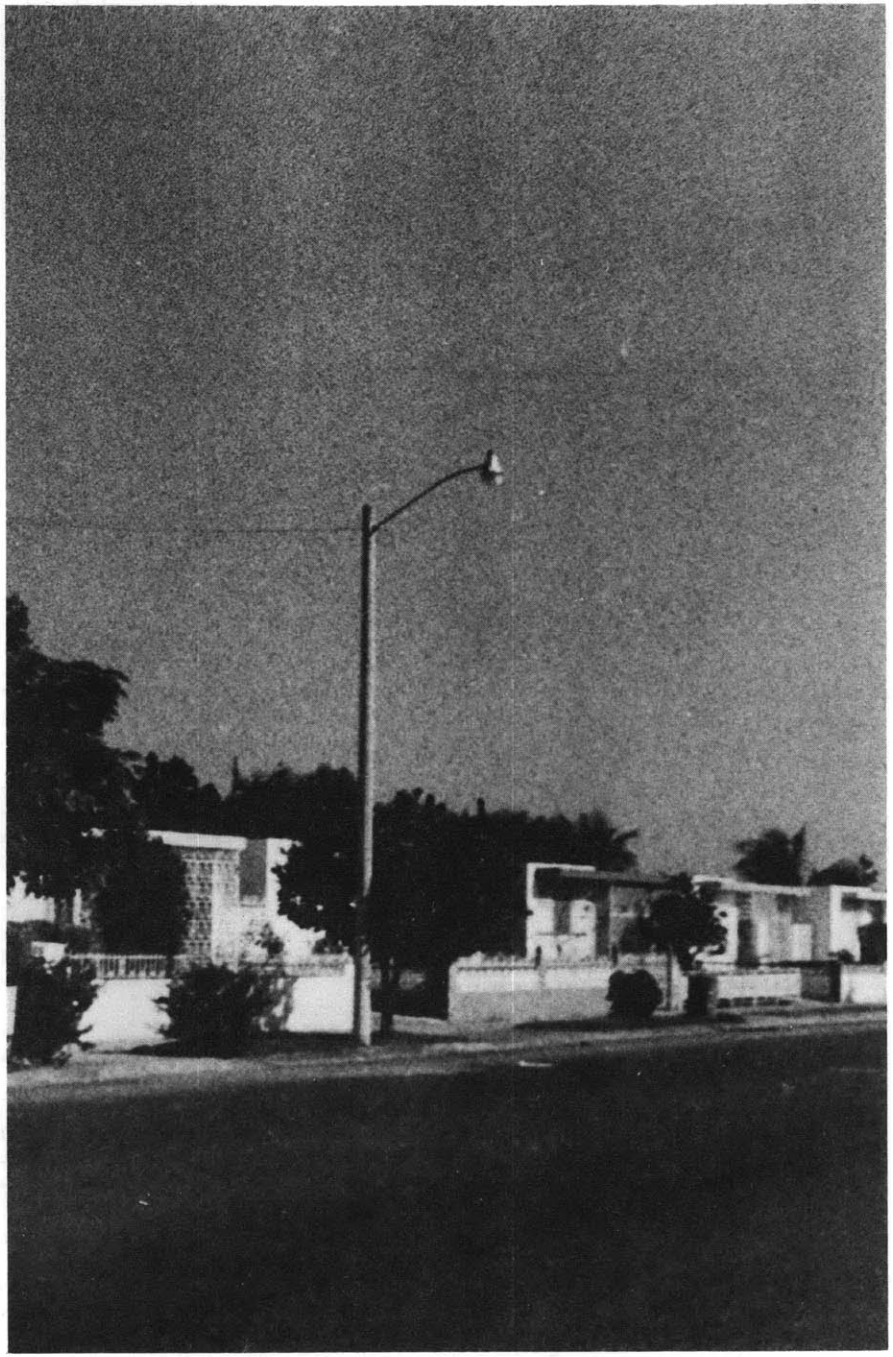
LR Living Room
D Dining
BR Bedroom
K Kitchen
T Toilet/Bathroom
L Laundry
C Closet
S Storage
R Room (multi-use)

PHYSICAL DATA
(related to dwelling and land)

DWELLING UNIT	
type:	INDIVIDUAL TRACT HOUSES
occupied:	96.4%
ownership:	84.9%
rental:	16.0%
persons per living unit	
1:	3.2%
2:	12.5%
3,4:	44.6%
5 or more:	39.4%
median:	4.1
LAND/ LOT	
utilization:	PRIVATE/PUBLIC
tenure:	LEGAL RENTAL/OWNERSHIP
DWELLING	
location:	CITY SUBURBS
type:	DETACHED HOUSE
units in structure:	
1:	97.0%
2:	1.5%
3,4:	1.5%
5 or more:	-
utilization:	SINGLE FAMILY
physical state:	GOOD
DWELLING DEVELOPEMENT	
mode:	INSTANT
developer:	PRIVATE
builder:	PRIVATE CONTRACTOR
construction types:	CAST IN PLACE CONCRETE
year of construction	
1960-1970:	100%
1950-1960:	-
1940-1950:	-
before 1940:	-
DWELLING FACILITIES	
service connections	
water:	100%
sewer:	100%
electricity:	100%
individual services	
cooking facilities:	100%
plumbing:	100%
DWELLING UNIT PAYMENT	
cost of unit:	$16,000
financing:	BANK,FHA,GOVT. MORTGAGE
payment per month:	$106 RENT
% of income	
income less than $3000:	35%+
$3000-$6000:	29.3%
$6000-$10000:	17.2%
$10000 or more:	16.3%

SOCIO-ECONOMIC DATA
(related to user)

GENERAL: SOCIAL	
user's ethnic origin	
native:	95.1%
native (foreign parents):	1.9%
foreign (born):	3.0%
education level	
none:	3.0%
elementary:	28.8%
high school:	47.4%
college:	20.6%
median:	12.1
FAMILY DATA	
number of families:	3,674
with children under 18:	68.1%
average family size:	4.8
GENERAL: ECONOMIC	
employment source	
goverment:	30.0%
private:	8.7%
private(self-employed):	61.3%
employment type	
construction:	4.9%
manufacturing:	15.7%
transportation:	6.6%
community services:	5.6%
trade:	20.7%
finance:	3.9%
business:	5.9%
personal services:	6.1%
health:	4.3%
education:	6.9%
professional services:	3.0%
public administration:	15.2%
other:	1.5%
TRAVEL TO WORK	
mode	
car (own):	62.5%
car (others):	10.0%
bus:	18.8%
"publico":	2.6%
walking:	3.8%
work at home/ other:	2.3%
MIGRATION PATTERNS	
year moved	
1960-1970:	100%
1950-1960:	-
before 1950:	-



CONCLUSION

CONCLUSION: Las Vegas is an example of the type of neighborhood which has created the urban fabric of Metropolitan San Juan in the last 20 years and which has been the main force in creating "urban sprawl."

The project was conceived and designed as a unit and, though built in sections should be considered an "instant" development. It is different from the greater number of such projects in that it does not border or lie within other projects, it is identifiable within certain boundaries and thus does not have the problems of meshing with the surrounding areas.

The main positive point of the project. at least in the eyes of the person buying, is that of tenure. Tenure of a piece of property and a dwelling is important in Puerto Rico; because, in addition to being a home and a shelter, tenure of a house is a symbol of economic solvency and social status. Unfortunately, due to the relationship between income earned and cost of units this can not be achieved unless the construction is cheap or the mortgage payments are low. For the vast majority who are excluded from public housing and cannot or will not buy in the city center, the solution as in Las Vegas is tract housing whose construction costs per unit are less (thus making conventional mortgages more accessible), and which qualifies for subsidized government mortgages for those how cannot afford conventional mortgages.

Unfortunately, the tradeoff for this security of tenure is tremendous. The most important problem these settlements have is the mythification by the middle class as their residential goal in life, and the creation of government housing policy around this idea.

The second problem is the zoning of the areas. Because of inflexible standards, a certain percent of the projects are zoned for commercial, institutional and recreational uses. Usually, as in the case of Las Vegas, they are grouped in one area with access only from the immediate vicinity which requires the use of a car. The areas are under used or misused, causing the people of the community to start unsanctioned commercial and religious establishments inthe immediate vicinity of the project.

The third problem is layout. The layout "bows" to the automobile in terms of street size, curbs, planting strips, storm sewers, accessible parking, etc., all of which are excessive in terms of the area served. However, it tries to curtail circulation by creating loop streets and dead-end streets. The result is not only poor vehicular circulation but also poor pedestrian circulation.

The fourth problem are the blocks. Like East Santurce and Buena Vista, Las Vegas suffers the limitations of back-to-back lots with set dimensions, a limitation augmented by the stricter codes and the types of units.

The fifth problem are the units themselves. Though the houses are handed out finished and complete, they are changed as soon as the owner is able, indicating a dissatisfaction with the uniformity and type of dwelling.

The sixth problem, is one of maintenance because the infrastructure per area served remains constant while the maintenance increases.

The seventh problem is economic. In the last decade the cost of the unit has risen faster than the income of the people. This, coupled with a decline in federally guaranteed mortgages and government reservations about this type of project, has made these developments less accessible than before and has created a whole group who cannot afford even federally guaranteed mortgages and do not qualify for public housing.

The final problem and definitely the most important is the use of land. Usually built on flat land and of very low density, they have gobbled up a great part of the flat agricultural land around the city center in a very short period of time, a process which if it had not been somewhat curtailed in the early 70's would have meant the city expanding over the greater area of the northwest plains of Puerto Rico.

EVALUATIONS

LAND USE: Of the five case studies the one with the most favorable percentages is Viejo San Juan. Due to the narrow streets and abutting sidewalks circulation area is low. The percentage of institutional and recreational facilities is high due to the great number of plazas, buildings and areas used for those purposes. Las Vegas percentages are, on the other hand, deceptive because of two reasons: The number of units served is low and the percentage of recreational and institutional reflect minimum property requirements rather than use; a fact proven by the underuse of the area. Both East Santurce and Buena Vista have the same problems. Circulation area is high due to a small rectangular grid in East Santurce and an irregular grid in Buena Vista. The percentage of institutional and recreational facilities is low due to the lack or defficiency of recreational facilities in both cases and the lack of institutional facilities in Buena Vista. Luis Llorens Torres' percentages reflect housing policy attitudes towards land tenure in very low income public housing projects. Public area is high due to the land around the buildings being used for circulation and as public facilities. Recreational and institutional percentages reflect, as in the case of Las Vegas, minimum.standarts rather than use.

NETWORK: The network which appears to work best is Las Vegas because it has the least lenght per hectare. This is, nevertheless, tempered by two things: the low number of units served by the network in a hectare and the convoluted layout. Luis Llorens Torres vehicular/ pedestrian network is low but this changes because of two things: the excesive pedestrian network (which in the representation reflect only de jure circulation)and the number of parking areas and the circulation they produce. Viejo San Juan network, though higher than Las Vegas, is low in terms of units served per hectare. East Santurce's network and Buena Vista's are quite similar in lenght per hectare but East Santurce is

more efficient because it is a regular grid-iron layout. Both networks are extensive because of small blocks grid.

DENSITY: The highest densities of the case studies are in the poorer areas. The highest is Luis Llorens Torres where the families are large, there are few singles or couples, and there is a large number of units per hectare. Luis Llorens Torres is followed by Buena Vista where the families are large, and there is a large number of units per hectare. Unlike Llorens Torres there is, however, a bigger percentage of older and younger singles or couples living in the area. East Santurce's density reflect the makeup of the area as well as the number of units per hectare. Viejo San Juan's density reflects various things: the exodus in the 30's out of the city, the large number of singles or couples without children as well as the large amount of area devoted to non-residential purposes. As a point of comparison San Juan had in 1900 five times the population and,thus,five times the density. The lowest density is in Las Vegas where the units per hectare is low. This is further worsened by the fact that the number of families with children is very high since there are few singles or couples in this type of community.

UNIT DENSITY: Luis Llorens Torres has the highest number of units per hectare due to its physical make-up. All the project residential structures are three stories walkups with various units clustered around the stairwell. Buena Vista's density is the result of variousthings: small lots, de facto condominiums within one lot and cluster conditions. Viejo San Juan's density reflects the many types of residential possibilities(single or multi-story, single house or multi unit building,cluster courts, etc.) tempered by the area which is not used for residential purposes. East Santurce's density reflects condominium policies within one block. Las Vegas reflects the legal policies under which it was created.

LAND UTILIZATION:

LAND USE: The percentages reflect two things: first, circulation area vs. public and private area as a whole and second institutional and recreational public area vs. private area.

THE SQUARE REPRESENTS 1 HECTARE

NETWORK: The grid graphic represents network lenght per hectare. For the purpose of accuracy the peripheral lines count for only half of their measured lenght.

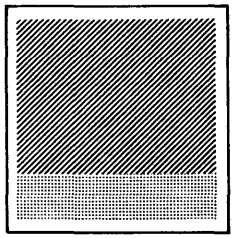
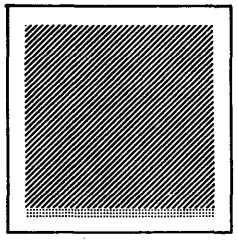
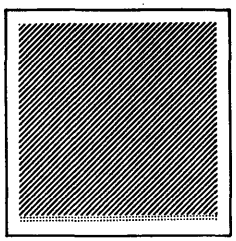
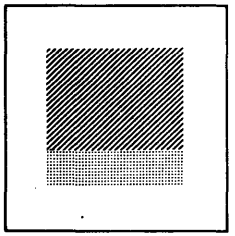
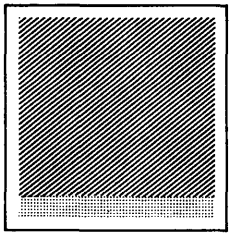
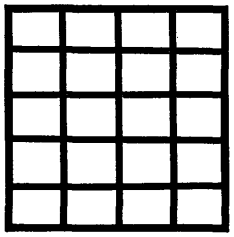
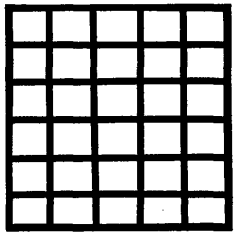
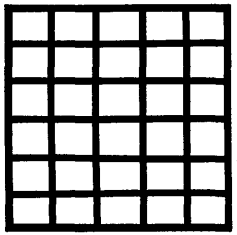
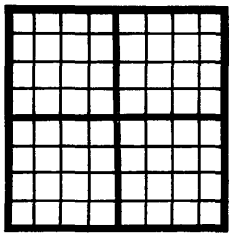
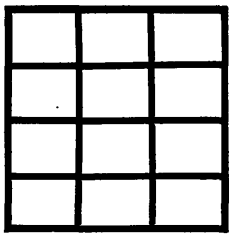
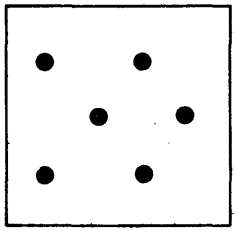
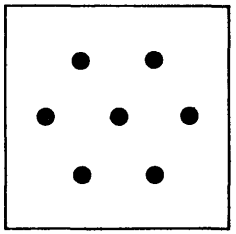
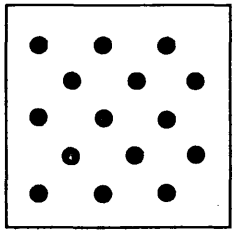
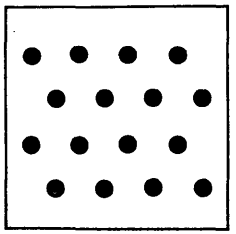
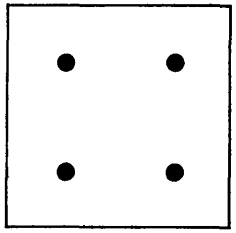
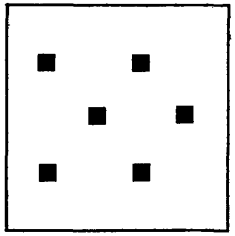
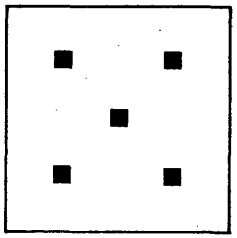
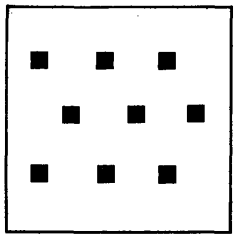
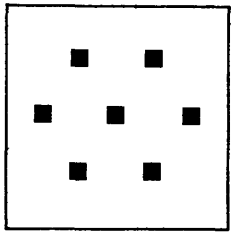
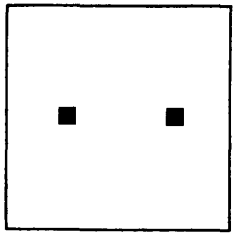
THE SQUARE REPRESENTS 16 HECTARE

DENSITY: The dot patterns represent persons per hectare with each dot representing 20 persons.

THE SQUARE REPRESENTS 1 HECTARE

UNIT DENSITY: The pattern of squares represent units per hectare with each square representing 10 units.

THE SQUARE REPRESENT 1 HECTARE

	VIEJO SAN JUAN	EAST SANTURCE	BUENA VISTA	LUIS LLORENS TORRES	LAS VEGAS
					
Streets/ Walkways	18%	29%	22%	69%	22%
Recreational/ Institutional	19%	5%	3%	10%	12%
Dwellings/ Lots	63%	67%	75%	21%	66%
					
	230 Meters/Ha.	275 Meters/Ha.	276 Meters/Ha.	395 Meters/Ha.	175 Meters/Ha.
					
	124 Persons/Ha.	144 Persons/Ha.	303 Persons/Ha.	321 Persons/Ha.	83 Persons/Ha.
					
	58 Units/Ha.	48 Units/Ha.	86 Units/ Ha.	69 Units/Ha	18 Units/Ha.

GLOSSARY

The criteria for the preparation of the definitions have been as follows:
-FIRST PREFERENCE: definitions from "Webster's Third New International Dictionary", Merriam-Webster,1971.
-SECOND PREFERENCE: definitions from technical dictionaries, text books, or reference manuals.
-THIRD PREFERENCE: definitions from the Urban Settlement Design Program (U.S.D.P.) Files. They are used when existing sources were not quite appropriate/satisfactory.

Words included for specificity and to focus on a particular context are indicated in parenthesis.

Sources of definitions are indicated in parenthesis. (See also: REFERENCES).

ACCESSES. The pedestrian/vehicular linkages from/to the site to/from existing or planned approaches (urban streets, limited access highways, public transportation systems, and other systems such as: waterways, airlines, etc.) (U.S.D.P.)

ACTUAL LAND COST. "(The cost of land is)...set solely by the level of demand. The price of land is not a function of any cost conditions; it is set by the users themselves in competition."(Turner, 1971)

AD VALOREM (TAX). A tax based on a property's value; the value taxed by local governments is not always or even usually the market value, but only a valuation for tax purposes. (U.S.D.P.)

AIRPORT DISTURBANCE. The act or process of destroying the rest, tranquility, or settled state of (the site by the annoyance of airport noise, vibration, hazards, etc.) (Merriam-Webster, 1971)

AIRPORT ZONING RESTRICTIONS. The regulation of the height or type of structures in the path of moving aircraft. (Abrams, 1971)

ALTERNATINC CURRENT (A.C.) (an electric) current that reverses its direction of flow at regular intervals. (ROTC ST 45-7, 1953)

AMENITY. Something that conduces to physical or material comfort or convenience, or which contributes satisfaction rather than money income to its owner. (Merriam-Webster, 1971)

AMPERES. Amperes (amp) are a measure of the rate of flow of electricity. It is somewhat comparable to the rate of flow of water (quantity/time). A steady current produced by one volt applied across a resistance of one ohm. (ROTC ST 45-7, 1953)

APPRAISAL. An estimate and opinion of value, especially by one fitted to judge. (Merriam-Webster, 1971)

APPROACHES. The main routes external to the site (pedestrian/vehicular) by which the site can be reached from other parts of the urban context. (U.S.D.P.)

ASSESSED VALUE. A valuation placed upon property by a public officer or board as a basis for taxation. (Keyes, 1971)

ASSESSMENT. The valuation of property for the purpose of levying a tax or the amount of the tax levied. (Keyes, 1971)

BACKFILL. Earth or other material used to replace material removed during construction, such as in culvert, sewer, and pipeline trenches and behind bridge abutments and retaining walls or between an old structure and a new lining. (DePina, 1972)

BARRIER. (A boundary) as a topographic feature or a physical or psychological quality that tends to separate or restrict the free movement (to and from the site). (Merriam-Webster, 1971)

BETTERMENT (TAX). A tax on the increment in value accruing to an owner because of development and improvement work carried out by local authorities. (U.S.D.P.)

BINDER COURSE. A transitional layer of bituminous paving between the crushed stone base and the surface course (to increase bond between base and surface course). (DePina, 1972)

BITUMINOUS. A coating of or containing bitumin; as asphalt or tar. (DePina, 1972)

BLOCK. A block is a portion of land bounded and served by lines of public streets. (U.S.D.P.)

BOUNDARY. Something (a line or area) that fixes or indicates a limit or extent (of the site). (Merriam-Webster, 1971)

BUILDING CODE. "A body of legislative regulations or by-laws that provide minimum standards to safeguard life or limb, health, property, and public welfare by regulating and controlling the design, construction, quality of materials, use and occupancy, location and maintenance of all buildings and structures within the city, and certain equipment specifically regulated therein." (BOCA, 1967)

BUILDING DRAIN. Lowest horizontal piping of the building drainage system receiving discharge from soil, waste, and other drainage pipes. It is connected to the building sewer. (ROTC ST 45-7, 1953)

BUILDING MAIN. Water-supply pipe and fittings from the water main or other source of supply to the first branch of the water-distribution system of a building. (ROTC ST 45-7, 1953)

CESS POOL. An underground catch basin that is used where there is no sewer and into which household sewage or other liquid waste is drained to permit leaching of the liquid into the surrounding soil. (Merriam-Webster, 1971)

CIRCULATION. System(s) of movement/passage of people, goods from place to place; streets, walkways, parking areas. (U.S.D.P.)

CLAY. A lusterless colloidal substance, plastic when moist (crystalline grains less than 0.002mm in diameter). (U.S.D.P.)

CLEANOUT. A plug or similar fitting to permit access to traps or sewer lines. Cleanouts are usually used at turns and other points of collection. (ROTC ST 45-7, 1953)

CLIMATE. The average condition of the weather at a particular place over a period of years as exhibited by temperature, wind, precipitation, sun energy, humidity, etc. (Merriam-Webster, 1971)

COLLECTION SYSTEM. The system of pipes in a sewage network, comprised of house service, collection lines, manholes, laterals, mains. (U.S.D.P.)

COMBINED SEWER. A sewer that carries both storm water and sanitary or industrial wastes. (DePina, 1972)

COMMUNITY. The people living in a particular place or region and usually linked by common interests: the region itself; any population cluster. (U.S.D.P.)

COMMUNITY FACILITIES/SERVICES. Facilities/services used in common by a number of people. It may include: schools, health, recreation, police, fire, public transportation, community center, etc. (U.S.D.P.)

COMMUNITY RECREATION FACILITIES. Facilities for activities voluntarily undertaken for pleasure, fun, relaxation, exercise, self-expression, or release from boredom, worry, or tension. (U.S.D.P.)

COMPONENT. A constituent part of the utility network. (U.S.D.P.)

CONDOMINIUM. Condominium is a system of direct ownership of a single unit in a multi-unit whole. The individual owns the unit in much the same manner as if it were a single family dwelling: he holds direct legal title to the unit and a proportionate interest in the common land and areas. Two types of condominiums are recognized: *HORIZONTAL:* detached, semi-detached, row/grouped dwelling types; *VERTICAL:* walk-up, high-use dwelling types. (U.S.D.P.)

CONDUCTORS. Materials which allow current to flow such as aluminum, copper, iron. (ROTC ST 45-7, 1953)

CONDUIT. A pipe or other opening, buried or above ground, for conveying hydraulic traffic, pipelines, cables, or other utilities. (DePina, 1972)

CONSERVATION EASEMENT. An easement acquired by the public and designed to open privately owned lands for recreational purposes or to restrict the use of private land in order to preserve open space and protect certain natural resources. (U.S.D.P.)

CONURBATION. Area of large urban communities where towns, etc. have spread and became joined beyond their administrative boundaries. (A.S. Hornby, A.P. Cowie, J. Windsor Lewis, 1975)

CONURBATION. An aggregation or continuous network of urban communities. (Merriam-Webster, 1963)

CORPORATION COCK/CORPORATION STOP. A water or gas cock by means of which utility-company employees connect or disconnect service lines to a consumer. (Merriam-Webster, 1971)

COSTS OF URBANIZATION. Include the following: *CAPITAL:* cost of land and infrastructure; *OPERATING:* cost of administration, maintenance, etc.; *DIRECT:* include capital and operating costs; *INDIRECT:* include environmental and personal effects. (U.S.D.P.)

CURRENT (See: ALTERNATING CURRENT, DIRECT CURRENT). An electric current is a movement of positive or negative electric particles (as electrons) accompanied by such observable effects as the production of heat, of a magnetic field, or of chemical transformation. (Merriam-Webster, 1971)

CYCLE. One complete performance of a vibration, electric oscillation, current alternation, or other periodic process. (Merriam-Webster, 1971)

DAM. A barrier preventing the flow of water; a barrier built across a water course to confine and keep back flowing water. (Merriam-Webster, 1971)

DEPRECIATION ACCELERATION (TAX). A tax incentive designed to encourage new construction by allowing a faster write-off during the early life of a building. (U.S.D.P.)

DESIGN. 1) The arrangement of elements that make up a work of art, a machine or other man-made object. 2) The process of selecting the means and contriving the elements, steps, and procedures for producing what will adequately satisfy some need. (Merriam-Webster, 1971)

DETACHED DWELLING. Individual dwelling unit, separated from others. (U.S.D.P.)

DEVELOPMENT. Gradual advance or growth through progressive changes; a developed tract of land (U.S.D.P.)

DEVELOPMENT SIZE. There are two general ranges of size: *LARGE:* may be independent communities requiring their own utilities, services, and community facilities; *SMALL:* generally are part of an adjacent urbanization and can use its supporting utilities, services, and community facilities. (U.S.D.P.)

DIRECT CURRENT (D.C.) (An electric current that) flows continuously in one direction. (ROTC ST 45-7, 1953)

DISCHARGE (Q). Flow from a culvert, sewer, channel, etc. (DePina, 1972)

DISTANCE. The degree or amount of separation between two points (the site and each other element of the urban context) measured along the shortest path adjoining them (paths of travel). (Merriam-Webster, 1971)

DISTRIBUTION (STATION). The part of an electric supply system between bulk power sources (as generating stations or transformation station tapped from transmission lines) and the consumers' service switches. (Merriam-Webster, 1971)

DISTURBED SOIL. Soils that have been disturbed by artificial process, such as excavation, transportation, and compaction in fill. (U.S.D.P.)

DRAINAGE. Interception and removal of ground water or surface water, by artificial or natural means. (De Pina, 1972)

DUST/DIRT. Fine dry pulverized particles of earth, grit, refuse, waste, litter, etc. (Merriam-Webster, 1971)

DWELLING. The general, global designation of a building/shelter in which people live. A dwelling contains one or more 'dwelling units'. (U.S.D.P.)

DWELLING BUILDER. Four groups are considered: *SELF-HELP BUILT:* where the dwelling unit is directly built by the user or occupant; *ARTISAN BUILT:* where the dwelling unit is totally or partially built by a skilled craftsman hired by the user or occupant; payments can be monetary or an exchange of services; *SMALL CONTRACTOR BUILT:* where the dwelling unit is totally built by a small organization hired by the user, occupant, or developer; 'small' contractor is defined by the scale of operations, financially and materially; the scale being limited to the construction of single dwelling units or single complexes; *LARGE CONTRACTOR BUILT:* where the dwelling unit is totally built by a large organization hired by a developer; 'large' contractor is defined by the scale of operations, financially and materially; the scale reflects a more comprehensive and larger size of operations encompassing the building of large quantities of similar units, or a singularly large complex. (U.S.D.P.)

DWELLING DENSITY. The number of dwellings, dwelling units, people or families per unit hectare. Gross density is the density of an overall area (ex. including lots, streets). Net density is the density of selected, discrete portions of an area (ex. including only lots). (U.S.D.P.)

DWELLING DEVELOPER. Three sectors are considered in the supply of dwellings: *POPULAR SECTOR:* the marginal sector with limited or no access to the formal financial, administrative, legal, technical institutions involved in the provision of dwellings. The housing process (promotion, financing, construction, operation) is carried out by the Popular Sector generally for 'self use' and sometimes for profit. *PUBLIC SEC-*

TOR: the government or non-profit organizations involved in the provision of dwellings. The housing process (promotion, financing, construction, operation) is carried out by the Public Sector for service (non-profit or subsidized housing). *PRIVATE SECTOR:* the individuals, groups or societies, who have access to the formal financial, administrative, legal, technical institutions in the provision of dwellings. The housing process (promotion, financing, construction, operation) is carried out by the Private Sector for profit. (U.S.D.P.)

DWELLING DEVELOPMENT MODE. Two modes are considered: *PROGRESSIVE:* the construction of the dwelling and the development of the local infrastructure to modern standards by stages, often starting with provisional structures and underdeveloped land. This essentially traditional procedure is generally practiced by squatters with de facto security of tenure and an adequate building site. *INSTANT:* the formal development procedure in which all structures and services are completed before occupation. (U.S.D.P.)

DWELLING FLOORS. The following numbers are considered: *ONE:* single story; generally associated with detached, semi-detached and row/group dwelling types. *TWO:* double story; generally associated with detached, semi-detached and row/group dwelling types. *THREE OR MORE:* generally associated with walk-up and high-rise dwelling types. (U.S.D.P.)

DWELLING GROUP. The context of the dwelling in its immediate surroundings. (U.S.D.P.)

DWELLING/LAND SYSTEM. A distinct dwelling environment/housing situation characterized by its users as well as by its physical environment. (U.S.D.P.)

DWELLING LOCATION. Three sectors are considered in single or multi-center urban areas. Sectors are identified by position as well as by the density of buildings as follows: *CENTER:* the area recognized as the business center of the city, generally the most densely built-up sector; *INNER RING:* the area located between the city center and the urban periphery, generally a densely built-up sector; *PERIPHERY:* the area located between the inner ring and the rural areas, generally a scatteredly built-up sector. (U.S.D.P.)

DWELLING PHYSICAL STATE. A qualitative evaluation of the physical condition of the dwelling types: room, apartment, house; the shanty unit is not evaluated. *BAD:* generally poor state of structural stability, weather protection, and maintenance. *FAIR:* generally acceptable state of structural stability, weather protection, and maintenance with some deviation. *GOOD:* generally acceptable state of structural stability, weather protection, and maintenance without deviation. (U.S.D.P.)

DWELLING TYPE. The physical arrangement of the dwelling unit: *DETACHED:* individual dwelling unit, separated from others. *SEMI-DETACHED:* two dwelling units sharing a common wall (duplex). *ROW/GROUPED:* dwelling units grouped together linearly or in clusters. *WALK-UP:* dwelling units grouped in two to five stories with stairs for vertical circulation. *HIGH-RISE:* dwelling units grouped in five or more stories with stairs and lifts for vertical circulation. (U.S.D.P.)

DWELLING UNIT. A self-contained unit in a dwelling for an individual, a family, or a group. (U.S.D.P.)

DWELLING UNIT AREA. The dwelling unit area (m^2) is the built-up, covered area of a dwelling unit. (U.S.D.P.)

DWELLING UNIT COST. The initial amount of money paid for the dwelling unit or the present monetary equivalent for replacing the dwelling unit. (U.S.D.P.)

DWELLING UNIT TYPE. Four types of dwelling units are considered: *ROOM:* A SINGLE SPACE usually bounded by partitions and specifically used for living; for example, a living room, a dining room, a bedroom, but not a bath/toilet, kitchen, laundry, or storage room. SEVERAL ROOM UNITS are contained in a building/shelter and share the use of the parcel of land on which they are built (open spaces) as well as common facilities (circulation, toilets, kitchens). *APARTMENT:* A MULTIPLE SPACE (room/set of rooms with bath, kitchen, etc.) SEVERAL APARTMENT UNITS are contained in a building and share the use of the parcel of land on which they are built (open spaces) as well as some common facilities (circulation). *HOUSE:* A MULTIPLE SPACE (room/set of rooms with or without bath, kitchen, etc.) ONE HOUSE UNIT is contained in a building/shelter and has the private use of the parcel of land on which it is built (open spaces) as well as the facilities available. *SHANTY:* A SINGLE OR MULTIPLE SPACE (small, crudely built). ONE SHANTY UNIT is contained in a shelter and shares with other shanties the use of the parcel of land on which they are built (open spaces). (U.S.D.P.)

DWELLING UTILIZATION. The utilization indicates the type of use with respect to the number of inhabitants/families. *SINGLE:* an individual or family inhabiting a dwelling. *MULTIPLE:* a group of individuals or families inhabiting a dwelling. (U.S.D.P.)

EASEMENT. Servitude: a right in respect of an object (as land owned by one person) in virtue of which the object (land) is subject to a specified use or enjoyment by another person or for the benefit of another thing. (Merriam-Webster, 1971)

EFFICIENCY. Capacity to produce desired results with a minimum expenditure of energy, time, money or materials. (Merriam-Webster, 1971)

EFFLUENT. Outflow or discharge from a sewer or sewage treatment equipment. (DePina, 1972)

ELEOTRIC FEEDER. That part of the electric distribution system between the transformer and the service drop or drops. (HUD, Mobile Court Guide, 1970)

ELECTRIC SERVICE DROP. That part of the electric distribution system from a feeder to the user's service equipment serving one or more lots. (HUD, Mobile Court Guide, 1970)

ELECTRIC TRANSFORMER. A device which changes the magnitude of alternating voltages and currents; generally from distribution voltages to user voltages; a distribution component that converts power to usable voltage. (TM 5 765 US Army, 1970; U.S.D.P.)

ELECTRICAL CIRCUIT. A closed, complete electrical path with various connected loads. Circuits may either be 'parallel' (voltage constant for all connected loads) or 'series' (voltage divided among connected loads). Parallel circuits are fixtures wired independent of each other, which are used in nearly all building wiring. (U.S.D.P.; ROTC ST 45-7, 1953)

ELECTRICAL FREQUENCY. The number of times an alternating electric current changes direction in a given period of time. Measured in cycles per second: hertz. (ROTC ST 45-7, 1953)

ELECTRIC GROUND. The electrical connection with the earth or other ground. (Merriam-Webster, 1971)

ELECTRICAL NETWORK COMPONENTS. It is composed of the following: *GENERATION:* produces electricity; *TRANSMISSION:* transports energy to user groups; *DISTRIBUTION STATION:* divides power among main user groups; *SUBSTATION:* manipulates power into useful energy levels for consumption; *DISTRIBUTION NETWORKS:* provides electric service to user. (U.S.D.P.)

ELECTRIC PHASE. May be either a single-phase circuit (for small electrical devices) or a three-phase circuit (for heavy equipment, large electrical devices). In single-phase only one current is flowing through the circuit with the voltage dropping to zero twice in each cycle. In three-phase currents flow through the circuit with the power never dropping to zero. (U.S.D.P.)

ELECTRICAL POWER. The source or means of supplying energy for use; measured in watts. (U.S.D.P.)

ELECTRICAL WIRING SYSTEMS. May either be single-phase or three-phase. *SINGLE-PHASE:* 2 hot wires with 1 neutral wire; *THREE-PHASE:* 3 hot wires with 1 neutral wire. (ROTC ST 45-7, 1953)

ELECTRICITY. Electrification: the process (network) for supplying (the site) with electric power. (Merriam-Webster, 1971)

EMBANKMENT (or FILL). A bank of earth, rock, or other material constructed above the natural ground surface. (DePina, 1972)

EROSION. The general process whereby materials of the earth's crust are worn away and removed by natural agencies including weathering, solution, corrosion, and transportation; (specific) land destruction and simultaneous removal of particles (as of soil) by running water, waves and currents, moving ice, or wind. (Merriam-Webster, 1971)

EXCRETA. Waste matter eliminated from the body. (U.S.D.P.)

EXISTING STRUCTURE. Something constructed or built (on the site). (U.S.D.P.)

EXPLORATORY BORING. Initial subsurface investigations (borings) are done on a grid superimposed on the areas of interest and on areas indicated as limited/restricted/hazard in the initial survey. (U.S.D.P.)

EXTERIOR CIRCULATION/ACCESSES (SITE PLANNING). The existing and proposed circulation system/accesses outside but affecting the site. These include limited access highways as well as meshing access to the surrounding area. Exterior circulation/accesses are generally given conditions. (U.S.D.P.)

FAUCET (also TAP). A fixture for drawing liquid from a pipe, cask, or other vessel. (Merriam-Webster, 1971)

FINANCING. The process of raising or providing funds. *SELF FINANCED:* provided by own funds; *PRIVATE/PUBLIC FINANCED:* provided by loan; *PUBLIC SUBSIDIZED:* provided by grant or aid. (U.S.D.P.)

FIRE/EXPLOSION HAZARDS. Danger: the state of being exposed to harm; liable to injury, pain, or loss from fire/explosion (at or near the site). (Merriam-Webster, 1971)

FIRE FLOW. The quantity (in time) of water available for fire-protection purposes in excess of that required for other purposes. (Merriam-Webster, 1971)

FIRE HYDRANT. A water tap to which fire hoses are connected in order to smother fires. (U.S.D.P.)

FIRE PROTECTION. Measures and practices for preventing or reducing injury and loss of life or property by fire. (Merriam-Webster, 1971)

FLEXIBLE PAVEMENT. A pavement structure which maintains intimate contact with and distributes loads to the subgrade and depends upon aggregate interlock, particle friction, and cohesion for stability. (DePina, 1972)

FLOODING. A rising and overflowing of a body of water that covers land not usually under water. (U.S.D.P.)

FLOODWAY FRINGE. The floodplain area landward of the natural floodway which would be inundated by low velocity flood waters. (U.S.D.P.)

FLOW METER. A device to measure flow of water. (U.S.D.P.)

FLUSH TANK TOILET. Toilet with storage tank of water used for flushing bowl. (U.S.D.P.)

FLUSH VALVE TOILET. Toilet with self-closing valve which supplies water directly from pipe. It requires adequate pressure for proper functioning. (U.S.D.P.)

FOOT CANDLE. A unit of illuminance on a surface that is everywhere one foot from a uniform point source of light of one candle and equal to one lumen per square foot. (Merriam-Webster, 1971)

FUMES. Gaseous emissions that are usually odorous and sometimes noxious. (Merriam-Webster, 1971)

GAS. A system for supplying natural gas, manufactured gas, or liquefied petroleum gas to the site and individual users. (U.S.D.P.)

GRADE. Profile of the center of a roadway, or the invert of a culvert or sewer. (DePina, 1972)

GRID BLOCKS. The block determined by a convenient public circulation and not by dimensions of lots. In grid blocks some lots have indirect access to public streets. (U.S.D.P.)

GRIDIRON BLOCKS. The blocks determined by the dimensions of the lots. In gridiron blocks all the lots have direct access to public streets. (U.S.D.P.)

GRID LAYOUTS. The urban layouts with grid blocks. (U.S.D.P.)

GRIDIRON LAYOUTS. The urban layouts with gridiron blocks. (U.S.D.P.)

GOVERNMENT/MUNICIPAL REGULATIONS. In urban areas, the development of the physical environment is a process usually controlled by a government/municipality through all or some of the following regulations: Master Plan, Zoning Ordinance, Subdivision Regulations, Building Code. (U.S.D.P.)

HEAD. (Static). The height of water above any plane or point of reference. Head in feet = (lb/sq. in. x 144)/(Density in lb/cu. ft.) For water at 68°F. (DePina, 1972)

HIGH-RISE. Dwelling units grouped in five or more stories with stairs and lifts for vertical circulation. (U.S.D.P.)

HOT WIRE. Wire carrying voltage between itself and a ground. (ROTC ST 45-7, 1953)

HYDRAULICS. That branch of science or engineering that deals with water or other fluid in motion. (DePina, 1972)

ILLEGAL. That which is contrary to or violating a rule or regulation or something having the force of law. (Merriam-Webster, 1971)

INCOME. The amount (measured in money) of gains from capital or labor. The amount of such gain received by a family per year may be used as an indicator of income groups. (U.S.D.P.)

INCOME GROUPS. A group of people or families within the same range of incomes. (U.S.D.P.)

INCREMENT (TAX). A special tax on the increased value of land, which is due to no labor/expenditure by the owner, but rather to natural causes such as the increase of population, general progress of society, etc. (U.S.D.P.)

INFRASTRUCTURE. The underlying foundation or basic framework for utilities and services: streets; sewage, water network; storm drainage, electrical network;

gas network; telephone network, public transportation; police and fire protection; refuse collection, health, schools, playgrounds, parks, open spaces. (U.S.D.P.)

INSULATOR. A material or body that is a poor conductor of electricity, heat, or sound. (Merriam-Webster, 1971)

INTERIOR CIRCULATION NETWORK (SITE PLANNING). The pedestrian/vehicular circulation system inside the site. It should be designed based upon the exterior circulation/accesses and land development requirements. (U.S.D.P.)

INTERVAL. A space of time (or distance) between the recurrences of similar conditions or states. (Merriam-Webster, 1971)

KILOWATT (kw). (1000 watts) A convenient manner of expressing large wattages. Kilowatt hours (kwh) measure the total quantity of energy consumed in a given time. One kwh represents the use of an average of 1 kilowatt of electrical energy for a period of 1 hour. (ROTC ST 45-7, 1953)

LAMPHOLE. A vertical pipe or shaft leading from the surface of the ground to a sewer, for admitting light for purposes of inspection. (U.S.D.P.)

LAND COST. Price: the amount of money given or set as the amount to be given as a consideration for the sale of a specific thing (the site). (Merriam-Webster, 1971)

LAND DEVELOPMENT COSTS. The costs of making raw land ready for development through the provision of utilities, services, accesses, etc. (U.S.D.P.)

LAND LEASE. The renting of land for a term of years for an agreed sum; leases of land may run as long as 99 years. (U.S.D.P.)

LAND-MARKET VALUE. Refers to: 1) the present monetary equivalent to replace the land; 2) the present tax based value of the land; or 3) the present commercial market value of the land. (U.S.D.P.)

LAND OWNERSHIP. The exclusive right of control and possession of a parcel of land. (U.S.D.P.)

LAND SUBDIVISION. The division of the land in blocks, lots and laying out streets. (U.S.D.P.)

LAND TENANCY. The temporary holding or mode of holding a parcel of land of another. (U.S.D.P.)

LAND UTILIZATION. A qualification of the land around a dwelling in relation to user, physical controls and responsiblity. *PUBLIC* (streets, walkways, open spaces): user -anyone/unlimited; physical controls -minimum; responsibility -public sector. *SEMIPUBLIC* (open spaces, playgrounds, schools): user -limited group of people; physical controls -partial or complete; responsibility -public sector and user. *PRIVATE* (dwellings, lots): user -owner or tenant or squatter; physical controls -complete; responsibility -user. *SEMI-PRIVATE* (cluster courts): user -group of owners and/or tenants; physical controls -partial or complete; responsibility -user. (U.S.D.P.)

LAND UTILIZATION: PHYSICAL CONTROLS. The physical/legal means or methods of directing, regulating, and coordinating the use and maintenance of land by the owners/users. (U.S.D.P.)

LAND UTILIZATION: RESPONSIBILITY. The quality/state of being morally/legally responsible for the use and maintenance of land by the owners/users. (U.S.D.P.)

LATERAL SEWER. A collector pipe receiving sewage from building connection only. (U.S.D.P.)

LATRINE. A receptacle (as a pit in the earth or a water closet) for use in defecation and urination, or a room (as in a barracks or hospital) or enclosure (as in a camp) containing such a receptacle. (Merriam-Webster, 1971)

LAYOUT. The plan or design or arrangement of something that is laid out. (Merriam-Webster, 1971)

LEVELS OF SERVICES. Two levels are considered: *MINIMUM*, are admissible or possible levels below the standard; *STANDARD*, are levels set up and established by authority, custom of general consent, as a model, example or rule for the measure of quantity, weight extent, value or quality. (U.S.D.P.)

LIFT PUMP. A collection system component that forces sewage to a higher elevation to avoid deep pipe networks. (U.S.D.P.)

LOCALITY. A relatively self-contained residential area/community/neighborhood/settlement within an urban area which may contain one or more dwelling/land systems. (U.S.D.P.)

LOCALITY SEGMENT. A 400m x 400m area taken from and representing the residential character and layout of a locality. (U.S.D.P.)

LOCATION. Situation: the way in which something (the site) is placed in relation to its surroundings (the urban context). (Merriam-Webster, 1971)

LOT. A measured parcel of land having fixed boundaries and access to public circulation. (U.S.D.P.)

LOT CLUSTER. A group of lots (owned individually) around a semipublic common court (owned in condominium). (U.S.D.P.)

LOT COVERAGE. The ratio of building area to the total lot area. (U.S.D.P.)

LOT PROPORTION. The ratio of lot width to lot depth. (U.S.D.P.)

LUMINAIRE. In highway lighting, a complete lighting device consisting of a light source, plus a globe, reflector, refractor, housing and such support as is integral with the housing. (DePina, 1972)

MANHOLE. An access hole sized for a man to enter, particularly in sewer and storm drainage pipe systems for cleaning, maintenance and inspection. (U.S.D.P.)

MATRIX (OF BASIC REFERENCE MODELS). A set of models of urban layouts arranged in rows and columns. (U.S.D.P.)

MASTER PLAN. A comprehensive, long range plan intended to guide the growth and development of a city, town or region, expressing official contemplations on the course its transportation, housing and community facilities should take, and making proposals for industrial settlement, commerce, population distribution and other aspects of growth and development. (Abrams, 1972).

MEDIAN BARRIER. A double-faced guard rail in the median or island dividing two adjacent roadways. (DePina, 1972)

MESHING BOUNDARIES. Characterized by continuing, homogeneous land uses or topography, expressed as: *LINES:* property lines, political or municipal divisions, main streets, etc.; *AREAS:* similar residential uses, compatible uses (as parks with residential). (U.S.D.P.)

MICROCLIMATE. The local climate of a given site or habitat varying in size from a tiny crevice to a large land area, but being usually characterized by considerable uniformity of climate. (Merriam-Webster, 1971)

MODE OF TRAVEL. Manner of moving from one place (the site) to another (other parts of the urban context). (U.S.D.P.)

MODEL (OF URBAN LAYOUT). A representation of an urban residential area illustrating circulation, land utilization, land subdivision, and utility network of a specific layout and lot. (U.S.D.P.)

MUTUAL OWNERSHIP. Private land ownership shared by two or more persons and their heir under mutual agreement. (U.S.D.P.)

NATURAL FEATURES. Prominent objects in or produced by nature. (U.S.D.P.)

NATURAL UNDISTURBED SOIL. Soils that have not been disturbed by artificial process. Although natural, they depend greatly on local conditions, environment, and past geological history of the formations. (U.S.D.P.)

NEIGHBORHOOD. A section lived in by neighbors and having distinguishing characteristics. (U.S.D.P.)

NETWORK EFFICIENCY (LAYOUT EFFICIENCY). The ratio of the length of the network to the area(s) contained within; or tangent to it. (U.S.D.P.)

NEUTRAL WIRE. Wire carrying no voltage between itself and a ground. (ROTC ST 45-7, 1953)

NOISE. Any sound (affecting the site) that is undesired (such as that produced by: traffic, airports, industry, etc.) (Merriam-Webster, 1971)

ODOR. A quality of something that affects the sense of smell. (Merriam-Webster, 1971)

OHMS (electrical). The unit of resistance to the flow electricity. The higher the number of ohms, the greater the resistance. When resistance is constant, amperage (and wattage) are in direct proportion to voltage. Resistance varies inversely with the cross-sectional area of the wire. Ohms = volts/amperes. R = E/I. The practical mks unit of electrical resistance that is equal to the resistance of a circuit in which a potential difference of one volt produces a current of one ampere or to the resistance in which one watt of power is dissipated when one ampere flows through it and that is taken as standard in the U.S. (U.S.D.P.; ROTC ST 45-7, 1953; Merriam-Webster, 1971)

OPTIMIZE/OPTIMALIZE. To bring to a peak of economic efficiency, specially by the use of precise analytical methods. (Merriam-Webster, 1971)

ORGANIC SOILS. Soils composed mostly of plant material. (U.S.D.P.)

OXIDATION POND (LAGOON). A method of sewage treatment using action of bacteria and algae to digest/decompose wastes. (U.S.D.P.)

PERCENT RENT/MORTGAGE. The fraction of income allocated for dwelling rental or dwelling mortgage payments; expressed as a percentage of total family income. (U.S.D.P.)

PIT PRIVY/LATRINE. A simple hole in the ground, usually hand dug, covered with slab and protective superstructure; for disposal of human excreta. (U.S.D.P.)

PLANNING. The establishment of goals, policies, and procedures for a social or economic unit, i.e. city. (U.S.D.P.)

PLOT/LOT. A measured parcel of land having fixed boundaries and access to public circulation. (U.S.D.P.)

POLICE PROTECTION. Police force: a body of trained men and women entrusted by a government with the maintenance of public peace and order, enforcement of laws, prevention and detection of crime. (Merriam-Webster, 1971)

POPULATION DENSITY. It is the ratio between the population of a given area and the area. It is expressed in people per hectare. It can be: *GROSS DENSITY:* includes any kind of land utilization, residential, circulation, public facilities, etc. *NET DENSITY:* includes only the residential land and does not include land for other uses. (U.S.D.P.)

POSITION. The point or area in space actually occupied by a physical object (the site). (Merriam-Webster, 1971)

PRIMER. A small introductory book on a specific subject. (U.S.D.P.)

PRIVATE LAND OWNERSHIP. The absolute tenure of land to a person and his heirs without restriction of time. (U.S.D.P.)

PRIVY. A small, often detached building having a bench with one or more round or oval holes through which the user may defecate or urinate (as into a pit or tub) and ordinarily lacking any means of automatic discharge of the matter deposited. (Merriam-Webster, 1971)

PROJECT. A plan undertaken; a specific plan or design. (U.S.D.P.)

PUBLIC CIRCULATION. The circulation network which is owned, controlled, and maintained by public agencies and is accessible to all members of a community. (U.S.D.P.)

PUBLIC FACILITIES. Facilities such as schools, playgrounds, parks, other facilities accessible to all members of a community which are owned, controlled, and maintained by public agencies. (U.S.D.P.)

PUBLIC SERVICES AND COMMUNITY FACILITES. Includes: public transportation, police protection, fire protection, refuse collection, health, schools, and playgrounds, recreation and open spaces, other community facilities, business, commercial, small industries, markets. (U.S.D.P.)

PUBLIC SYSTEM (general). A system which is owned and operated by a local governmental authority or by an established public utility company which is controlled and regulated by a governmental authority. (HUD/AID, Minimum Standards, 1966)

PUBLIC UTILITIES. Includes: water supply, sanitary sewerage, storm drainage, electricity, street lighting, telephone, circulation networks. (U.S.D.P.)

PUMP. A device or machine that raises, transfers, or compresses fluids or that attenuates gases especially by suction or pressure or both. (Merriam-Webster,1971)

REFUSE COLLECTION. The service for collection and disposal of all the solid wastes from a community. (U.S.D.P.)

RESERVOIR. Large-scale storage of water; also functions to control fluctuations in supply and pressure. (U.S.D.P.)

RESIDENTIAL AREA. An area containing the basic needs/requirements for daily life activities: housing, education, recreation, shopping, work. (U.S.D.P.)

RESISTANCE. The opposition to electrical flow. (Resistance increases as the length of wires is increased and decreases as the cross-sectional area of wires is increased). (ROTC ST 45-7, 1953)

RIGHT-OF-WAY. A legal right of passage over another person's ground (land), the area or way over which a right-of-way exists such as: a path or thorough-fare which one may lawfully use, the strip of land devoted to or over which is built a public road, the land

occupied by a railroad, the land used by a public utility. Rights-of-way may be shared (as streets; pedestrians and automobiles) or exclusive (as rapid transit routes; subways, railroads, etc.) (Merriam-Webster, 1971; U.S.D.P.)

ROADWAY (HIGHWAY). Portion of the highway included between the outside lines of gutter or side ditches, including all slopes, ditches, channels, and appurtenances necessary to proper drainage, protection, and use. (DePina, 1972)

ROW/GROUPED HOUSING. Dwelling units grouped together linearly or in clusters. (U.S.D.P.)

RUNOFF. That part of precipitation carried off from the area upon which it falls. (DePina, 1972)

RUNOFF-RAINFALL RATIO. The percentage (ratio) of stormwater runoff that is not reduced by evaporation, depression storage, surface wetting, and percolation; with increased rainfall duration, runoff-rainfall ratios rise increasing runoff flow. (U.S.D.P.)

SAND. Loose, distinguishable grains of quartz/feldspar, mica (ranging from 2mm to 0.02mm in diameter). (U.S.D.P.)

SANITARY SEWERAGE. The system of artificial usually subterranean conduits to carry off sewage composed of: *excreta:* waste matter eliminated from the human body; *domestic wastes:* used water from a home/community containing 0.1% total solids; and some *industrial wastes*, but not water from ground, surface, or storm. (U.S.D.P.)

SEMI-DETACHED DWELLING. Two dwelling units sharing a common wall (duplex). (U.S.D.P.)

SEPTIC TANK. A tank in which the organic solid matter of continuously flowing sewage is deposited and retained until it has been disintegrated by anaerobic bacteria. (Merriam-Webster, 1971)

SERIES CIRCUIT. Fixtures connected in a circuit by a single wire. When one fixture is out, the circuit is broken. Fixtures with different amperages cannot be used efficiently in the same circuit. (ROTC ST 45-7, 1953)

SETTLEMENT. Occupation by settlers to establish a residence or colony. (U.S.D.P.)

SEWAGE. The effluent in a sewer network. (U.S.D.P.)

SEWER. The conduit in a subterranean network used to carry off water and waste matter. (U.S.D.P.)

SEWER BUILDING CONNECTION. The pipe connecting the dwelling with the sewer network. (U.S.D.P.)

SEWERAGE. Sewerage system: the system of sewers in a city, town or locality. (Merriam-Webster, 1971)

SHAPE. Form/configuration of the site surface as defined by its perimeter/boundaries. (U.S.D.P.)

SHOPPING. (Facilities for) searching for, inspecting, or buying available goods or services. (U.S.D.P.)

SILT. Loose, unconsolidated sedimentary rock particles (ranging from 0.02mm to 0.002mm in diameter). (U.S.D.P.)

SITE. Land (that could be) made suitable for building purposes by dividing into lots, laying out streets and providing facilities. (Merriam-Webster, 1971)

SITE AREAS. Two types are considered: *GROSS AREA:* includes the whole site or the bounded piece of ground. *USABLE AREA:* includes only the portion of the site that can be fully utilized for buildings, streets, playgrounds, recreation facilities, gardens, or other structures. (U.S.D.P.)

SITE AND SERVICES. The subdivision of urban land and the provision of services for residential use and complementary commercial use. Site and services projects are aimed to improve the housing conditions for the low income groups of the population by providing: *a) SITE:* the access to a piece of land where people can build their own dwellings; *b) SERVICES:* the opportunity of access to employment, utilities, services and community facilities, financing and communications. (U.S.D.P.)

SIZE. Physical magnitude or extent (of the site), relative or proportionate dimensions (of the site). (Merriam-Webster, 1971)

SLOPE. Degree or extent of deviation (of the land surface) from the horizontal. (Merriam-Webster, 1971)

SMOKE. The gaseous products of burning carbonaceous materials made visible by the presence of carbon particles. (Merriam-Webster, 1971)

SOIL. Soil structure: the arrangement of soil particles in various aggregates differring in shape, size, stability, and degree of adhesion to one another. (Merriam-Webster, 1971)

SOIL INVESTIGATION. It is the process to find the soil structure and other characteristics. It may include the following stages: initial soil survey, exploratory boring, construction boring. (U.S.D.P.)

SOIL PIPE. The pipe in a dwelling which carries the pipe discharge from water closets. (U.S.D.P.)

SOIL SURVEY (INITIAL). An on-site examination of surface soil conditions and reference to a GENERAL SOIL MAP. It is used to reveal obvious limitations/restrictions/hazards for early planning consideration. (U.S.D.P.)

STACK. The vertical pipe in a dwelling of the soil-, waste-, or vent-pipe systems. (ROTC ST 45-7, 1953)

STANDARD. 1) Something that is established by authority, custom or general consent as a model or example to be followed. 2) Something that is set up and established by authority as a rule for the measure of quantity, weight, extent, value or quality. (Merriam-Webster, 1971)

STANDPIPE. A pipe riser with tap used as a source of water for domestic purposes. (HUD/AID, Minimum Standards, 1966)

STORM DRAINAGE. Storm sewer: a sewer (system) designed to carry water wastes except sewage (exclusively storm water, surface runoff, or street wash). (Merriam-Webster, 1971)

STREET LIGHTING. Illumination to improve vision at night for security and for the extension of activities. (U.S.D.P.)

SUBDIVISION REGULATIONS. Regulations governing the development of raw land for residential or other purposes. (Abrams, 1972)

SUBGRADE. The layer of natural soil or fill (compacted soil) upon which the pavement structure including curbs is constructed. (DePina, 1972)

SUBMAIN or BRANCH SEWER. A collector pipe receiving sewage from lateral sewer only. (U.S.D.P.)

SUBSISTENCE INCOME. The minimum amount of money required for the purchase of food and fuel for an average family to survive. (U.S.D.P.)

SULLAGE. Drainage or refuse especially from a house, farmyard, or street. (Merriam-Webster, 1971)

TAP (also FAUCET). A fixture for drawing a liquid from a pipe, cask, or other vessel. (Merriam-Webster, 1971)

TAX EXEMPTION. A grant by a government of immunity from taxes; (a ten-year tax exemption on new housing in New York stimulated new construction in the 1920's; to ease its housing shortage, Turkey granted a ten-year tax exemption on new buildings). (Abrams, 1966)

TAX INCENTIVE. Favorable tax treatment to induce the beneficiary to do something he would not otherwise be likely to do. (U.S.D.P.)

TAX STRUCTURE - TAXATION. The method by which a nation (state, municipality) implements decisions to transfer resources from the private sector to the public sector. (U.S.D.P.)

TELEPHONE. An electrical voice communication network interconnecting all subscribing individuals and transmitting over wires. (U.S.D.P.)

TENURE. Two situations of tenure of the dwelling units and/or the lot/land are considered: *LEGAL:* having formal status derived from law; *EXTRALEGAL:* not regulated or sanctioned by law. Four types of tenure are considered: *RENTAL:* where the users pay a fee (daily, weekly, monthly) for the use of the dwelling unit and/or the lot/land; *LEASE:* where the users pay a fee for long-term use (generally for a year) for a dwelling unit and/or the lot/land from the owner (an individual, a public agency, or a private organization); *OWNERSHIP:* where the users hold in freehold the dwelling unit and/or the lot/land which the unit occupies; *EMPLOYER-PROVIDED:* where the users are provided a dwelling unit by an employer in exchange for services, i.e. domestic live-in servant. (U.S.D.P.)

TITLE. The instrument (as a deed) that constitutes a legally just cause of exclusive possession (of land, dwellings, or both). (Merriam-Webster, 1971)

TOILET. A fixture for defecation and urination, esp. water closet. (7th Collegiate Webster, 1963)

TOPOGRAPHY. The configuration of a (land) surface including its relief and the position of its natural and man-made features. (Merriam-Webster, 1971)

TRANSPORTATION. Means of conveyance or travel from one place (the site) to another (other parts of the urban context). (Merriam-Webster, 1971)

TRAP. A fitting that provides a water seal to prevent sewer gases and odors being discharged through fixtures. (ROTC ST 45-7, 1953)

TREATMENT WORKS. Filtration plant, reservoirs, and all other construction required for the treatment of a water supply. (ROTC ST 45-7, 1953)

UNIT. A determinate quantity adopted as a standard of measurement for other quantities of the same kind. (Merriam-Webster, 1971)

URBAN TRANSPORTATION. Means of conveyance of passengers or goods from one place to another along ways, routes of circulation in a metropolitan context. (U.S.D.P.)

URBANIZATION. The quality or state of being or becoming urbanized; to cause to take on urban characteristics. (U.S.D.P.)

USE TAX. The tax on land aimed primarily at enforcing its use or improvement. (U.S.D.P.)

USER INCOME GROUPS. Based upon the subsistence (minimum wage) income per year, five income groups are distinguished: *VERY LOW (below subsistence level):* the income group with no household income available for housing, services, or transportation; *LOW (1 x subsistence level):* the income group that can afford no or very limited subsidized housing; *MODERATE (3 x subsistence level):* the income group that can afford limited housing and rent only with government assistance; *HIGH (5 x subsistence level):* the income group that can afford housing without subsidy, by cash purchase, through mortgage payments, or by rent; *VERY HIGH (10 x subsistence level):* the income group that represents the most economically mobile sector of the population. (U.S.D.P.)

USUFRUCT. The right to profit from a parcel of land or control of a parcel of land without becoming the owner or formal leasee; legal possession by decree without charge. (U.S.D.P.)

UTILITIES. Include: water supply, sanitary sewerage, storm drainage, electricity, street lighting, gas, telephone. (U.S.D.P.)

UTILITY/SERVICE. The organization and/or infrastructure for meeting the general need (as for water supply, wastewater removal, electricity, etc.) in the public interest. (U.S.D.P.)

VALVE. A water supply distribution component which interrupts the supply for maintenance purposes. (U.S.D.P.)

VENT. A pipe opening to the atmosphere, which provides ventilation for a drainage system and prevents trap siphonage or back pressure. (ROTC ST 45-7, 1953)

VIBRATION. A quivering or trembling motion (such as that produced by: heavy traffic, industry, aircraft, etc. (Merriam-Webster, 1971)

VIEWS. That which is revealed to the vision or can be seen (from the site). (Merriam-Webster, 1971)

WALK-UP. Dwelling units grouped in two to five stories with stairs for vertical circulation. (U.S.D.P.)

WASTE PIPE. A pipe (in a dwelling) which carries water from wash basins, sinks, and similar fixtures. (ROTC ST 45-7, 1953)

WATER SUPPLY. Source, means, or process of supplying water, (as for a community) usually involving reservoirs, pipelines, and often the watershed from which the water is ultimately drawn. (Merriam-Webster, 1971)

WATERSHED. The catchment area or drainage basin from which the waters of a stream or stream system are drawn. (Merriam-Webster, 1971)

WATERWORKS. The whole system of reservoirs, channels, mains, and pumping and purifying equipment by which a water supply is obtained and distributed to consumers. (Merriam-Webster, 1971)

WATT. Watts (w) measure the power of the flow of energy through a circuit. Wattage is the product of volts times amperes. Both watts and hosepower denote the rate of work being done. 746w = 1hp. (ROTC ST 45-7, 1953)

ZONING ORDINANCE. The demarcation of a city by ordinance into zones (areas/districts) and the establishment of regulations to govern the use of land and the location, bulk, height, shape, use, population density, and coverage of structures within each zone. (U.S.D.P.)

BIBLIOGRAPHY

Abbad y Lassierra, Fray Iñigo. HISTORIA GEOGRAFICA CIVIL Y NATURAL DE LA ISLA DE SAN JUAN BAUTISTA DE PUERTO RICO. San Juan: Imprenta Porta Coeli, 1971.

Administracion de Renovacion Urbana y Vivenda (ARUV). ESTUDIO SOCIO ECONOMICO DE LAS FAMILIAS Y LA VIVIENDA EN EL CAÑO MARTIN PEÑA. San Juan, 1969.

_____. PUBLIC HOUSING AND SLUM CLEARANCE IN PUERTO RICO. San Juan, 1966.

_____. OPINIONES, ACTIVIDADES Y REACCIONES DE PERSONAS QUE SERAN RELOCALIZADAS POR PROGRAMAS DE RENOVACION URBANA Y VIVIENDA. San Juan, 1972.

_____. NECESIDADES Y PROBLEMAS QUE PERCIBEN LOS RESIDENTES EN VIVIENDA PUBLICA EN CUATRO DISTRITOS DE SAN JUAN. San Juan, 1969.

_____. SATISFACCION CON LA VIVIENDA A BAJO COSTO. San Juan, 1968.

_____. FINANCIAL ASPECTS OF HOUSING. San Juan, 1971.

Asociacion de Construcctores de Hogares de Puerto Rico. LA INDUSTRIA DE CONSTRUCCION DE HOGARES EN PUERTO RICO. San Juan, 1975.

Baldwin, John. CLIMATES OF THE UNITED STATES. Washington: Department of Commerce.

Baldwin, John M. GUIDE FOR SURVEY EVALUATION OF URBAN DWELLING ENVIRONMENTS. Cambridge, 1974.

Barrañano, Eduardo. UNA CIUDAD - UN PUEBLO. San Juan: Junta de Planificacion, 1964 .

Bartholomew, Harland. A PRELIMINARY CITY INVESTIGATION OF SAN JUAN, P.R. (Mimeographed) 1957.

Bas, Carlos Alberto and Sepulveda, Anibal. EL DESAROLLO URBANO DE SAN JUAN Y LA PLANIFICACION URBANA EN PUERTO RICO, Revista de la Sociedad Interamericana de Planificacion 1976

Brau, Salvador. HISTORIA DE PUERTO RICO. San Juan: Editorial Coqui, 1966.

Caplow, Theodore, Samuel E. Wallace and Sheldon Stryker. THE URBAN AMBIENCE: SAN JUAN, PUERTO RICO. New Jersey: Bedminster Press, 1964.

Caminos, H., Turner, J. and Steffian, J. URBAN DWELLING ENVIRONMENTS. Cambridge: MIT Press, 1969.

De Hostos, Adolfo. CRECIMIENTO Y DESAROLLO DE LA CIUDAD DE SAN JUAN. San Juan: Editorial I.C.P., 1957.

Department of Health (P.R.). ANNUAL VITAL STATISTICS REPORT. San Juan, 1976.

Department of Commerce (U.S.). U.S. CENSUS, SAN JUAN METROPOLITAN AREA. Washington, D.C 1970.

_____. BLOCK STATISTICS, SAN JUAN METROPOLITAN AREA. Washington, D.C., 1970.

Feldt, Allan G., Rosall Nolan, Stein, Stuart. RESIDENTIAL ENVIRONMENT AND SOCIAL BEHAVIOR: A STUDY OF SELECTED NEIGHBORHOODS IN SAN JUAN, PUERTO RICO. Ithaca (Preliminary Draft), 1977.

Frankenhoff, Charles A. THE ECONOMICS OF A *HOUSING POLICY FOR A DEVELOPING ECONOMY:PUERTO* RICO. S.Juan: Social Science Research Center, 1967.

Goodsell, Charles T. ADMINISTRATION OF A REVOLUTION. Cambridge, Mass.: Harvard University Press, 1965.

Haring, C.H. THE SPANISH EMPIRE IN AMERICA. New York: Oxford University Press, 1947.

Herrero, Jose Antonio. LA MITOLOGIA DEL AZUCAR (mimeo)

Icken Safa, Helen. THE URBAN POOR OF PUERTO RICO. New York: Holt, Rinehart, Winston, 1974.

Junta de Planificacion. STATISTICAL YEARBOOK Puerto Rico 1976. San Juan, 1977.

_____. INFORME ECONOMICO AL GOBERNADOR. San Juan, 1977.

_____. PLAN DE CUATRO AÑOS. San Juan, 1977

_____. HOUSING ELEMENT.San Juan,1977.

_____. INDICADORES SOCIO ECONOMICOS POR REGION. San Juan, 1970.

Lewis, Gordon K. PUERTO RICO: FREEDOM AND POWER IN THE CARIBBEAN. New York: Monthly Review Press, 1974.

_____. NOTES ON THE PUERTO RICAN REVOLUTION. New York: Monthly Review Press, 1974.

Lewis, Oscar. LA VIDA: A PUERTO RICAN FAMILY IN THE CULTURE OF POVERTY-SAN JUAN AND NEW YORK. New York: Random House, 1966.

Lopez, Adalberto and Petras, James, Editors. PUERTO RICO AND THE PUERTORRICANS. New York: Halsted Press, 1974.

Maldonado Denis, Manuel. PUERTO RICO: A SOCIO-ECONOMIC INTERPRETATION. New York: Random House, 1972.

Morales Carrion, Arturo. PUERTO RICO AND THE NON-HISPANIC CARIBBEAN. Baltimore: Waverly Press, 1952.

Municipio de San Juan. SAN JUAN 2000. San Juan, 1977.

Pico, Rafael. THE GEOGRAPHIC REGIONS OF PUERTO RICO. Baltimore: Waverly Press, 1950.

_____. PLANIFICACION Y ACCION. San Juan, Banco Gubernamental de Fomento, 1962.

Prieto, Claudio. EL CONCEPTO DEL "HOGAR PROPIO" UNA POLITICA HABITACIONAL CONTRADICTORIA. Plerus, Vol. V., Num. 1, Rio Piedras, 1971.

Prieto, Myrna. PERSPECTIVAS NECESARIAS EN LA FORMULACION DE LA POLITICA HABITACIONAL. Plerus, Vol. V, Num. 1, Rio Piedras, 1971.

Puerto Rican Government. TALLERES DEL NUEVO PUERTO RICO. (8 Volumes: Empleo, Adiestramiento y Educacion; Uso de Terrenos, Otros Recursos Naturales, e Infrastructura; Politica Fiscal y Economica; Urbanismo y Vivienda; Costo de la Vida; Planificacion Social; Grupos No-Participantes and Recreacion y Uso del Tiempo Libre). San Juan, 1974.

Ruiz Villarrubia, Osvaldo. EL DISEÑO URBANO DEL SAN JUAN ANTIGUO COMO RESPUESTA AL CAMBIO FUNCIONAL . Rio Piedras, Plerus, Vol. VI, Num. 1, 1972.

San Juan Legal Services, Inc. SOCIAL AND ECONOMIC CHARACTERISTICS OF THE SAN JUAN METROPOLITAN AREA. San Juan, 1977.

Seda Bonilla, Eduardo. REQUIEM POR UNA CULTURA. San Juan, Editorial Edil, 1978.

Togwell, Rexford G. THE STRICKEN LAND. New York: Doubleday, 1947.

Villamil, Jose J. EVALUACION DE LA PLANIFICACION EN PUERTO RICO. Revista de la Sociedad Inter-Americana de Planificacion, Vol. 1: Buenos Aires, 1967.

Wagenheim, Karl. PUERTO RICO: A PROFILE. New York: Praeger Publishers, 1970.

Wells, Henry K. THE MODERNIZATION OF PUERTO RICO. New Haven: Yale U Press, 1969.

EQUIVALENTS

QUALITY OF INFORMATION

The quality of information given in drawings, charts and descriptions has been qualified in the following manner:

Approximate: when deduced from different and/or not completely reliable sources.
Accurate: when taken from reliable or actual sources.

METRIC SYSTEM EQUIVALENTS

Linear Measures	
1 centimeter	= 0.3937 inches
1 meter (= 100 centimeters)	= 39.37 inches or 3.28 feet
1 kilometer (= 1,000 meters)	= 3,280.83 feet or 0.62137 miles
1 inch	= 2.54 centimeters
1 foot	= 0.3048 meters
1 mile	= 1.60935 kilometers
Square Measures	
1 square meter	= 1,550 square inches or 10.76 square feet
1 square foot	= 0.0929 square meters
1 cuerda	= 0.9712 acre 3,929.798 square meters
1 acre	= 0.4087 hectares
1 hectare	= 2.4771 acres
1 square mile	= 258.999 hectares

NOTES ON THE SOURCES:

CRUV: Corporacion de Renovacion Urbana y Vivienda

DTOP: Departamento de Transportacion y Obras Publicas

DOLLAR VALUES

Puerto Rico's currency is the U.S. Dollar. Where costs or income have been used they should be used mainly for comparative purposes.